SOIL SURVEY OF

Lincoln County, Nebraska

U.S. Department of Agriculture
Soil Conservation Service
In cooperation with
University of Nebraska
Conservation and Survey Division

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1957–71. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. This survey was made cooperatively by the Soil Conservation Service and the Conservation and Survey Division of the University of Nebraska. It is part of the technical assistance furnished to the Twin Platte and Middle Republican Natural Resources Districts.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and windbreaks; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for agriculture, industry, and recreation.

Locating Soils

All of the soils of Lincoln County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" at the back of this survey can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability units (dryland and irrigated), range site, and windbreak suitability group to which each soil belongs. It also shows the page where each soil is described and the pages where the capability units are discussed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units, range sites, and windbreak suitability groups.

Foresters and others can refer to the section "Management of the Soils for Woodland and Windbreaks," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife and Recreation."

Ranchers and others can find, under "Management of the Soils for Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the section "Engineering Uses of the Soils" and in the descriptions of the soils.

Engineers and builders can find, in the section "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers to Lincoln County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County."

Cover picture: **The field of Holdrege silt loam in the foreground has been bench leveled for irrigation. This conservation practice allows a uniform application of irrigation water and helps control erosion.**

Contents

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Index to Soil Mapping Units

Summary of Tables

SOIL SURVEY OF LINCOLN COUNTY, NEBRASKA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE UNIVERSITY OF NEBRASKA, CONSERVATION AND SURVEY DIVISION

LINCOLN COUNTY, the third largest county in Nebraska, is in the west-central part of the state (fig. 1). It is 48 miles wide from south to north, 54 miles long from west to east, and has a total area of 1,614,720 acres. Several reservoirs and water areas larger than 40 acres occupy an additional 12,100 acres. North Platte, the county seat, is about midway between Omaha and Denver.

Lincoln County is within the Great Plains physiographic province. Its landscape consists of a southeastward sloping upland plain into which the Platte Rivers have incised broad valleys. The North Platte and South Platte Rivers are about 4 miles apart where they enter Lincoln County from Keith County on the west, and they join to form the Platte River just east of the city of North Platte. The Platte flows in an east-southeast direction to the east county line, where it enters Dawson County. The valleys of these rivers consist of nearly flat bottom lands and very gently sloping to nearly flat stream terraces. Most of the upland north of the Platte Rivers and much of the western half of the upland south of these rivers consists of sandhills interspersed with sandy valleys. The eastern half of the upland south of the Platte Rivers and also smaller areas in the southwestern and northeastern parts of the county consist of deeply dissected loess plains. Between the North and South Platte Rivers is a narrow, eroded remnant of the upland plain.

A small area in the northeastern part of the county drains northward to the South Loup River. Most of the southern third of the county drains southward to the Republican River. The remaining two-thirds of the county drains to the Platte Rivers.

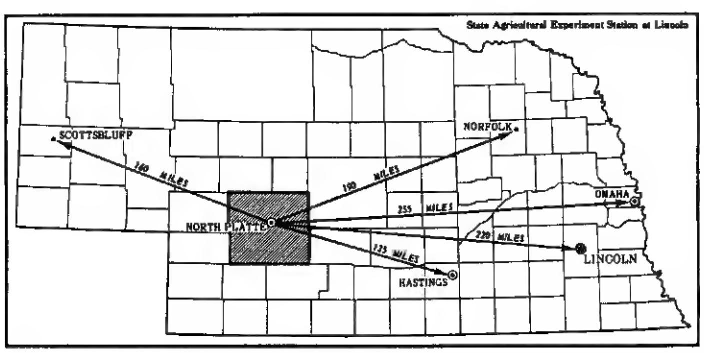

Figure 1.—**Location of Lincoln County in Nebraska.**

Soils in Lincoln County have widely different characteristics. Most upland soils are deep, but those on the narrow upland remnant between the North Platte and South Platte Rivers are deep to very shallow. Soils on stream terraces and bottom lands are also deep to very shallow. Upland and terrace soils are mostly fine sand, fine sandy loam, and silt loam, whereas bottom land soils are mostly loam, silt loam, and loamy fine sand. A few bottom-land soils are moderately strongly alkaline or strongly alkaline. Upland soils are well drained to excessively drained, terrace soils are well drained to somewhat poorly drained, and bottom land soils are well drained, somewhat poorly drained, poorly drained, or very poorly drained. A few soils have a claypan layer, and a few are shallow over sand and gravel. Slopes range from nearly level to very steep. Depth to water in many bottom-land soils is less than 5 feet. Blown-out land and Rough broken land, loess, are land types on uplands; Slickspots, Gravelly alluvial land, Wet alluvial land, Riverwash, Muck, and Marsh are land types on bottom lands.

Erosion by water is the principal hazard in areas of silty soils, and blowing is the main hazard in areas of sandy soils. Preventing runoff and maintaining fertility are important concerns when managing soils that formed in loess. Maintaining a good grass cover is the principal concern in areas of sloping silty soils on the loess plains and in areas of sandy soils in the sandhills region. Occasional flooding and the shallow water table are important concerns when managing soils in the valleys.

The climate of Lincoln County is characterized by warm summers and cold winters. Rapid day-to-day changes in temperature and general weather conditions are common. At North Platte, average annual precipitation is 20 inches and average annual snowfall is 31 inches. The average length of the growing season is 154 days.

Lincoln County, once called Shorter County, was organized in 1866 and, at one time, comprised most of western Nebraska and parts of Colorado and Wyoming. The Union Pacific Railroad was finished to North Platte in 1866, the first school was built in 1868, and the first courthouse was constructed in 1876. In 1934, the Platte Valley Public Power and Irrigation District built several large reservoirs for power and irrigation purposes. In 1937, the Tri-County Irrigation District was organized and, in 1939, this District built Kingsley Dam on the North Platte River about 20 miles upstream from Lincoln County. These Districts made a significant contribution to the development of agriculture in Lincoln County and in other counties to the east and southeast.

In 1970, the population of Lincoln County was 29,538; that of North Platte was 19,447 and of all the other villages combined 2,273; the rural population constituted 26 percent of the total. The population of the county declined from 1930 to 1940 but has increased steadily since that time.

Farming and ranching are the principal enterprises in Lincoln County, although some rural residents around North Platte supplement their income by off-the-farm jobs. According to the 1969 Agricultural Census, 26 percent of the total acreage of the county is in cropland, 69 percent is in range and other lands, about 1 percent is in woodland, and the remaining 4 percent is nonfarm land. The principal crops are corn, alfalfa, hay, grain sorghum, and wheat. Minor crops are rye, oats, potatoes, sugar beets, soybeans, and field beans. Most farmers and ranchers raise cattle, some raise hogs and chickens, and a few have large flocks of sheep. Most ranchers have riding horses.

A large amount of information has been accumulated about the different kinds of soils of Lincoln County. Improved methods of minimum tillage and grass management, newly adapted crops, recent improvements in methods of applying irrigation water and maintaining fertility, along with improved varieties of grass and trees have increased production and helped to stabilize the agriculture. The identification and location of the different kinds of soils in this survey along with their morphological and interpretive descriptions and groupings will help concerned users of the soils to make further progress.

The first soil survey of Lincoln County, Nebraska, was published in 1926 (*4*)[1]. The present survey updates the earlier report.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Lincoln County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. In addition to collecting many facts about the soils, they observed the steepness, length, and shape of slopes, the size and nature of streams, the kinds of native plants or crops, and the kinds of rock. They probed many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. A soil series is commonly named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Holdrege and Valentine, for example, are the names of two soil series. In the United States all soils having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Valentine fine sand, rolling, is one of several phases within the Valentine series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Lincoln County: soil complexes and undifferentiated soil groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils joined by a hyphen. Hersh-Anselmo fine sandy loams, 1 to 3 percent slopes, is an example of a soil complex in Lincoln County.

An undifferentiated soil group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils joined by "and." Hersh and Anselmo soils, 9 to 30 percent slopes, is an undifferentiated soil group in Lincoln County.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gravelly alluvial land is a land type in Lincoln County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

[1] Italic numbers in parentheses refer to Literature Cited, page 116.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or to a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Lincoln County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management and use.

Soil association names and delineations on the general soil map for this county do not agree fully with those of previously published general soil maps for adjacent counties. The differences result from improvements in the classification or from refinements in soil series concepts. More precise maps were needed because the uses of the general soil map have expanded in recent years. The more modern maps meet this need.

The eleven soil associations in Lincoln County have been grouped into seven general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included soil associations are described in the following pages. The terms for texture used in the title of the associations apply to the texture of the surface layer. For example, in the title of the Hersh-Valentine-Anselmo association, the words "loamy and sandy" refer to the texture of the surface layer.

Sandy Soils on Uplands

Only one association is in this group. It consists mainly of nearly level to very steep, excessively drained, sandy soils.

1. Valentine association

Deep, nearly level to very steep, excessively drained, sandy soils on uplands

This association consists mainly of sandhills and dry valleys. Smooth, undulating to rolling hills and choppy, steep to very steep hills are interspersed with gently undulating areas and small, enclosed, nearly level valleys (fig. 2). Crests of the steepest hills are the highest elevations in the landscape. Catsteps are common on the steepest slopes.

The Valentine association occupies about 52 percent of the county. Valentine soils make up about 98 percent of the association. The remaining 2 percent is minor soils and land types.

Valentine soils are in valleys and on hummocks, hills, and dunes in the sandhills parts of the county. They are deep, excessively drained, and nearly level to very steep. The surface layer and underlying material generally are fine sand but are loamy fine sand in places.

Minor soils in this association are mainly in the Anselmo, Dunday, Hersh, Loup, and Vetal series. Blown-out land is also included. Anselmo soils are in swales and basins. Dunday soils generally are lower in elevation than Valentine soils and are in dry valleys and swales and on foot slopes. Hersh soils occur in small valleys and basinlike areas that have been or are cultivated. Loup soils are along the narrow flood plains of Birdwood, Pawnee, and White Horse Creeks. Vetal soils occupy basinlike areas. Blown-out land is mainly on hillsides and crests of the sandhills. It consists mostly of cup-shaped hollows and depressions that are being severely eroded by wind.

Nearly all of the Valentine association is in native grass. Where the association is hilly, the grass is used for grazing, and where nearly level or gently undulating, it is used for hay. A small acreage is cultivated. Corn, mixed grass and legume pasture, feed grains, and alfalfa are the principal crops. Some of the nearly level to gently undulating areas, mostly in swales and valleys, are irrigated by means of center-pivot or other types of sprinkler systems.

Ranching is well adapted to soils in this association. Maintaining desirable kinds of grass through a planned grazing system, establishing adequate and proper placement of water facilities and salt sources, and reseeding areas that have been cultivated in past years are the main concerns of management. On the less sloping soils, good potential exists for increasing the acreage of cultivated crops and pasture grasses through use of sprinkler irrigation systems. Soil blowing and drought are the main hazards. Fertilizers are needed because most of the soils are low in natural fertility.

Ranches in the Valentine association average about 5,500 acres in size. Most ranchers have a cow-calf operation, selling the calves locally in the fall. A few, however, purchase calves at a weight of about 450 pounds and sell them as yearlings or two-year-old feeders. Native grass provides grazing through summer, and prairie hay is the major feed supply during winter. Many ranchers purchase alfalfa hay and a protein supplement to be used with the prairie hay. Most cattle are marketed in local sale barns, but some are delivered to markets in adjacent counties. Paved and improved gravel highways cross the association. Although

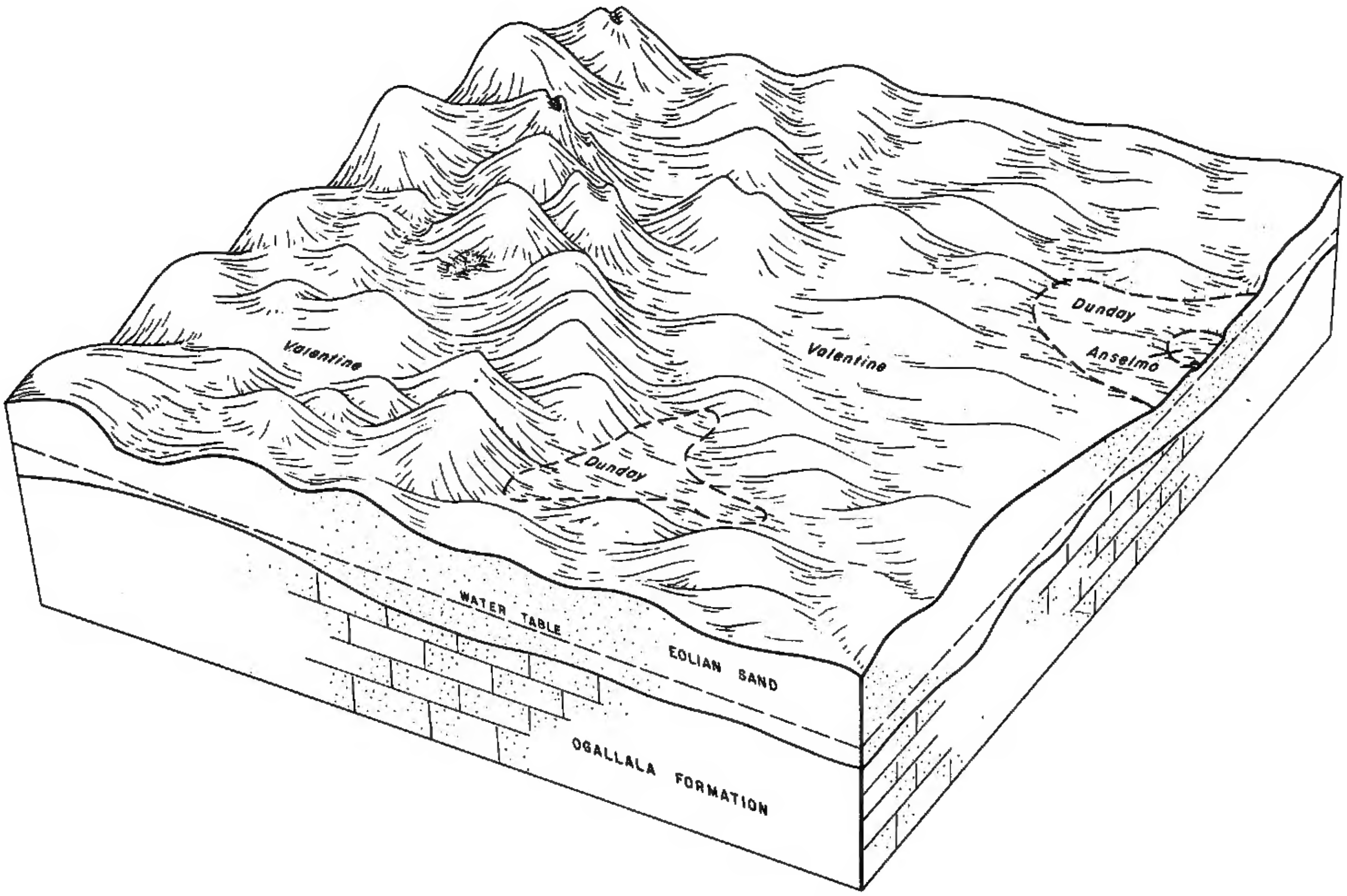

***Figure 2.*—Soils of the Valentine association and their relation to parent materials.**

few good roads are on section lines, most ranchers have access to the improved roads that lead to supply centers and markets. Roads are more common in the area south of the Platte Valley than in the area north of the valley. Many ranch headquarters are in this association, although some are in the Platte Valley where they are more readily accessible. A few ranch headquarters are in sparsely settled areas that can be reached only on poorly maintained roads.

Loamy and Sandy Soils on Uplands and Stream Terraces

Two soil associations are in this group. They consist of nearly level to steep, well-drained and excessively drained, loamy and sandy soils.

2. *Hersh-Valentine-Anselmo association*

Deep, nearly level to steep, well-drained and excessively drained, loamy and sandy soils on uplands and stream terraces

This association consists of uplands that are mostly in areas between soils formed in sandy parent material and those formed in loamy parent material. The sandy and loamy materials are intermixed in these transition areas, although some soils are predominantly sandy and some are predominantly silty (fig. 3). A large part of the landscape was formed by the wind, has low relief, and has poorly defined surface drainage. These upland areas are crossed by only a few small stream valleys. Isolated areas of sandy or silty soils also are included in this association.

The Hersh-Valentine-Anselmo association occupies about 9 percent of the county. Hersh soils make up about 31 percent of the association, Valentine soils 29 percent, and Anselmo soils 12 percent. The remaining 28 percent consists of minor soils and land types.

Hersh soils are on convex hillsides and ridges of the uplands and on a few old stream terraces. They are deep, well drained, and nearly level to steep. The profile is mostly fine sandy loam but is loamy fine sand in places.

Valentine soils are in dry valleys and on hummocks, hills, and dunes of uplands. They are deep, excessively drained, and nearly level to steep. The surface layer and underlying material generally are fine sand but are loamy fine sand in places.

Anselmo soils are on convex ridges and hummocks of uplands and stream terraces. They are deep, well drained, and nearly level to moderately steep. The surface layer generally is fine sandy loam or sandy loam but is loamy fine sand in places. The subsoil is fine sandy loam or loam. The underlying material is fine sandy loam in the upper part and loamy fine sand in the lower part.

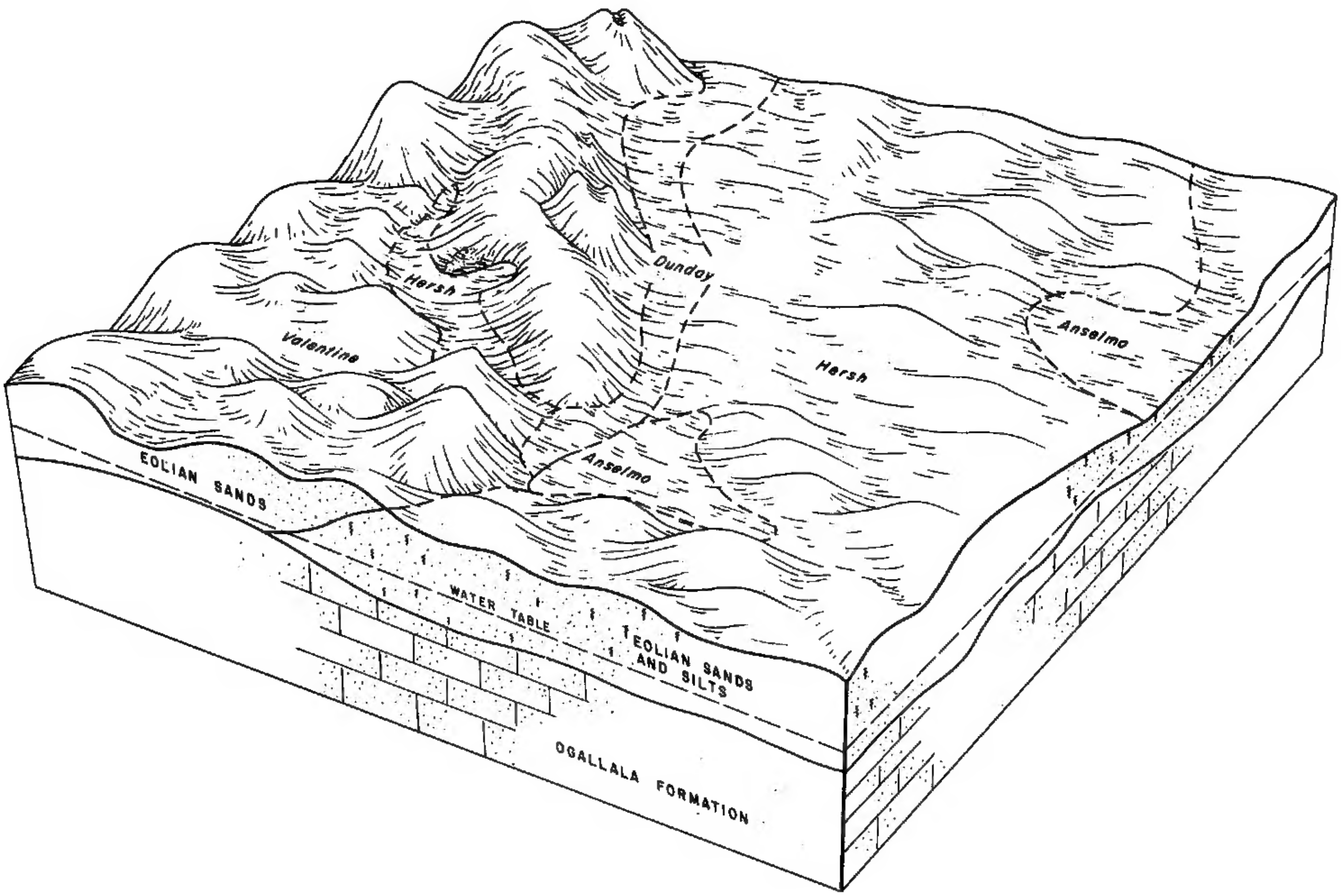

Figure 3.—**Soils of the Hersh-Valentine-Anselmo association and their relation to parent materials.**

Minor soils in this association are mainly in the Dunday, Holdrege, and Hord series. Dunday soils are in dry valleys and in swales that are at lower elevations than Valentine soils. Holdrege soils are silty and occupy broad, convex ridges on the tableland and sideslopes of drainageways. Hord soils are silty and are in swalelike areas on the tableland.

Most of the acreage of the Hersh-Valentine-Anselmo association is dryfarmed. Wheat, grain sorghum, and alfalfa are the principal dryland crops. A small acreage is irrigated and corn is the principal irrigated crop. The moderately sloping and steep areas adjacent to drainageways and some sandy areas are used primarily for range.

Erosion by water, soil blowing, and drought are the main hazards on cultivated soils in this association. Proper range use and a planned grazing system are needed on much of the sandy rangeland. As a result of recently developed center-pivot sprinkler systems, the trend is toward the increased use of irrigation. Good potential exists for increasing the acreage of irrigated crops and pasture grasses where the water supply is adequate.

Farms in the Hersh-Valentine-Anselmo association average about 800 acres in size. They are diversified and consist primarily of the combination cash grain-livestock type. Ranches are larger than farms and commonly include land in adjacent associations. Gravel or improved dirt roads are on about a half of the section lines. A few areas of this association are crossed by major paved highways. Farm produce is marketed mainly at North Platte, but some is delivered to markets in smaller towns in Lincoln County and in adjoining counties.

3. *Dix-Hersh-Creighton association*

Deep and shallow over mixed sand and gravel, gently sloping to steep, well-drained and excessively drained, sandy and loamy soils on uplands

This association consists of a deeply dissected, narrow ridge between the North and South Platte Rivers in the western part of the county. Short, natural drainageways carry runoff to the adjacent valleys. Although small in size, this association is characterized by a wide variety of soils and parent materials.

The Dix-Hersh-Creighton association occupies only about 0.5 percent of the county. Dix soils make up about 42 percent of the association, Hersh soils 26 percent, and Creighton soils 20 percent. The remaining 12 percent is minor soils.

Dix soils are on upland hillsides and breaks. They are shallow over mixed sand and gravel, are excessively drained, and are gently sloping to steep. These soils have a sandy loam surface layer and a gravelly sandy loam transition

layer. Mixed coarse sand and gravel is at a depth of about 16 inches.

Hersh soils occupy the highest elevations in this association. They are deep, well drained, and gently sloping to steep. The profile is mostly fine sandy loam but is loamy fine sand in places.

Creighton soils are on the lower side slopes of hills and are generally at lower elevations than Dix soils. They are deep, well drained, and moderately sloping to steep. The profile is mostly loam, but the surface layer is very fine sandy loam in places.

Minor soils in this association are mainly in the Anselmo and Coly series. Anselmo soils are on the upper part of the landscape with Hersh soils. Coly soils occupy some of the highest elevations in the western part of the association.

All of the Dix-Hersh-Creighton association is in native grass and is used for range. Little potential exists for other agricultural uses, because the landscape is rough and has a high proportion of shallow soils.

Proper range use and a planned grazing system are needed on the range in this association. Erosion is a hazard where adequate plant cover is not maintained.

No farmsteads or ranching headquarters are in the Dix-Hersh-Creighton association. Range areas are from 160 to 1,200 acres in size and commonly are part of farming units in adjacent soil associations. Roads crossing the association are few and generally not on section lines.

Silty Soils on Dissected Uplands

Only one association is in this group. It consists of moderately sloping to very steep, well-drained and excessively drained, silty soils.

4. Coly-Rough broken land, loess association

Deep, moderately sloping to very steep, well-drained and excessively drained, silty soils on narrow divides and deep drainageways of loess uplands

This association consists of alternating divides and natural drainageways in the loess uplands (fig. 4). The divides are mostly narrow and moderately sloping, and the drainageways are moderately sloping to very steep. Streams are intermittent or spring-fed tributaries of the South Platte, Platte, and Republican Rivers. A few of the larger canyons and drainageways have narrow flood plains.

The Coly-Rough broken land, loess association occupies about 17 percent of the county. Coly soils make up about 49 percent of the association and Rough broken land, loess, 35 percent. The remaining 16 percent is minor soils and land types.

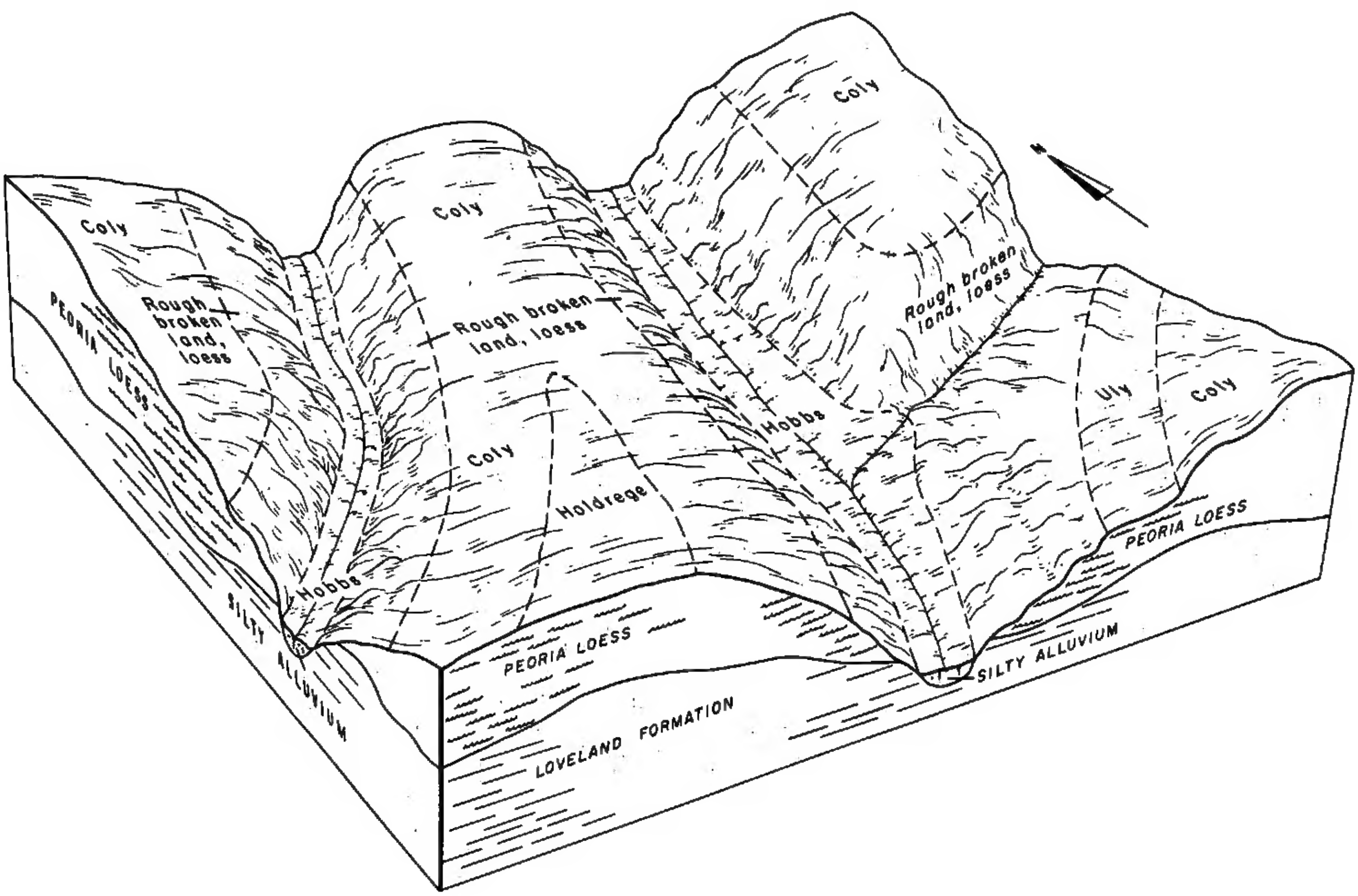

Figure 4.—Soils and land types of the Coly-Rough broken land, loess association and their relation to parent materials.

Coly soils are in narrow divides and on upper side slopes of valleys and canyons. They are deep, well drained, and moderately sloping to steep. These soils have a thin surface layer and are silt loam throughout the profile.

Rough broken land, loess, occupies the side walls of canyons and side slopes of drainageways. It is excessively drained and is steep to very steep. This land type is medium textured.

Minor soils in this association are in the Holdrege, Uly, Hobbs, Hord, Creighton, and McCook series. Holdrege soils are on ridges and divides between canyons. Uly soils are at lower elevations than Holdrege soils or on sideslopes at lower elevations than Coly soils. Hobbs soils occupy the narrow flood plains of canyons. McCook soils are on bottom lands of the wider drainageways. Hord soils are in small areas on the broadest divides and commonly occur in slight swales. Creighton soils occupy lower parts of side slopes of uplands adjacent to the Platte Valley.

Nearly all of the steep and very steep areas in the Coly-Rough broken land, loess association are in native grass and are used for grazing beef cattle. Most of the less steep areas are cultivated. Corn and alfalfa are the principal cultivated crops on the broader ridges; some wheat and grain sorghum also are grown. Alfalfa and feed grain are grown on bottom land in the narrow canyons and on ridges that are broad enough to cultivate. A few areas on the broader ridgetops are irrigated.

Erosion by water and gully cutting are very severe hazards on the rangeland. Soil blowing, erosion by water, and drought are the main hazards in cultivated areas. Runoff is rapid or very rapid from most areas. Proper range use and a planned grazing system are needed on the range. Fertilizers are needed on the cultivated soils.

Farms and ranches in the Coly-Rough broken land, loess association average about 2,500 acres in size. Some farms are diversified and are of the combination cash grain-livestock type. Most farmers and ranchers have a cow-calf operation and some have a feeder-calf program. Farm and ranch headquarters are commonly several miles apart. Only a few roads are on section lines, but gravel and improved dirt roads traverse the narrow valleys and ridgetops. Farm produce is marketed mainly at North Platte in Lincoln County and at Curtis in adjacent Frontier County.

Silty Soils on Smooth Uplands

Two associations are in this group. They consist of nearly level to steep, well-drained, silty soils.

5. *Uly-Holdrege-Coly association*

Deep, gently sloping to steep, well-drained, silty soils on broad divides and drainageways of loess uplands

This association consists of alternating broad divides and drainageways in the loess uplands (fig. 5). The divides are gently sloping to moderately sloping. The drainageways, which are mostly moderately steep or steep, contain intermittent tributaries of North Plum Creek, East Deer Creek Canyon, West Deer Creek Canyon, and Blackwood Valley.

The Uly-Holdrege-Coly association occupies about 3 percent of the county. Uly soils make up about 55 percent of the association, Holdrege soils 24 percent, and Coly soils 11 percent. The remaining 10 percent is minor soils and land types.

Uly soils are on ridgetops of the narrowest divides, on side slopes of the broader divides, and on hillsides adjacent to drainageways. They are deep, well drained, and gently sloping to steep. These soils are silt loam throughout the profile.

Holdrege soils are on broad divides and hillsides. They are deep, well drained, and gently sloping to moderately sloping. The surface layer of these soils is silt loam, the subsoil is silt loam in the upper part and light silty clay loam in the lower part, and the underlying material is silt loam.

Coly soils are mainly on hillsides and side slopes that border the intermittent drainageways. They are deep, well drained, and moderately sloping to steep. These soils have a thin surface layer and are silt loam throughout the profile.

Minor soils in this association are mainly in the Hobbs series or in Rough broken land, loess. Hobbs soils are in the flood plains of drainageways and in valleys of the larger streams. Rough broken land, loess, is on sides of canyons and is very steep. Catsteps are common and unaltered loess is exposed in many places.

The less sloping soils in the Uly-Holdrege-Coly association are cultivated under dryland management. Corn, wheat, and grain sorghum are the principal crops. The more sloping soils are mostly in native grass and are used for grazing beef cattle.

Erosion by water, soil blowing, and drought are hazards in areas of cultivated soils. Proper range use and a planned grazing system are needed on much of the range.

Farms in the Uly-Holdrege-Coly association average about 2,200 acres in size. They are diversified and consist mainly of the combination cash grain-livestock type. Small cow-calf herds are common, and some feeder livestock is fattened and marketed. Farm produce is marketed mostly at Curtis in adjoining Frontier County, but some is delivered to North Platte and some to Lexington in Dawson County. Gravel or improved dirt roads cross the association but only a few roads are on section lines.

6. *Holdrege-Hord-Uly association*

Deep, nearly level to moderately sloping, well-drained, silty soils on tableland and broad ridges of loess uplands

This association consists of uplands that are mantled with a thick deposit of silty loess. It is mostly broad tableland but is dissected by shallow to moderately deep, intermittent drainageways in places. A few depressions and basins are on the tableland.

The Holdrege-Hord-Uly association occupies about 6 percent of the county. Holdrege soils make up about 37 percent of the association, Hord soils 32 percent, and Uly soils 14 percent. The remaining 17 percent is minor, but strikingly different, soils.

Holdrege soils are on broad divides and on side slopes to drainageways. They are deep, well drained, and nearly level to moderately sloping. The surface layer of these soils is silt loam, the subsoil is silt loam in the upper part and light silty clay loam in the lower part, and the underlying material is silt loam.

Hord soils are in concave or swalelike positions, generally at lower elevations than Holdrege soils. These soils have a silt loam surface layer. The subsoil, to a depth of 60 inches, is silt loam in the upper and lower parts and light silty clay loam in the middle part.

Uly soils are on convex ridges and on side slopes of hills. They are deep, well drained, and gently sloping to moderately sloping. These soils are silt loam throughout the profile.

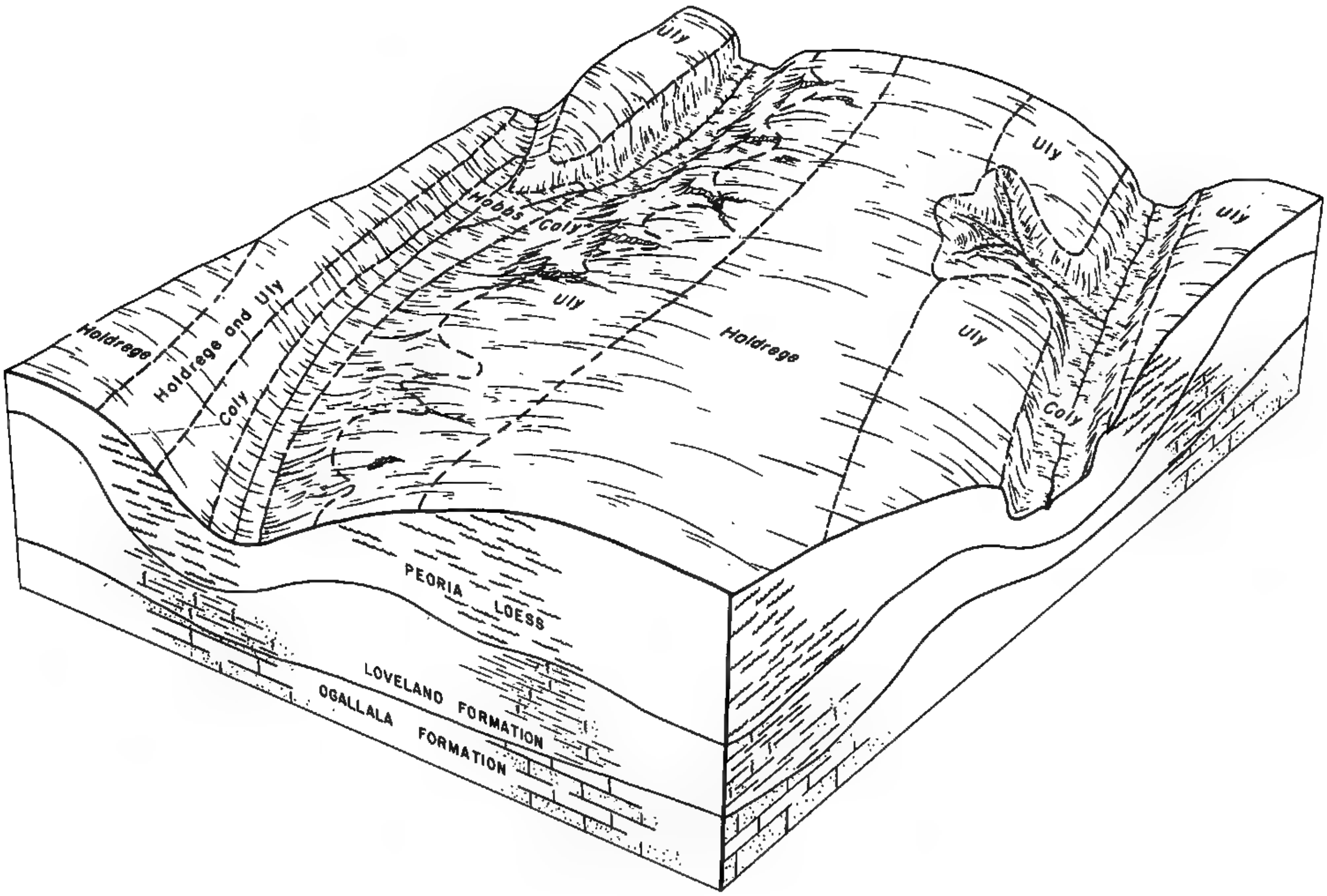

Figure 5.—**Soils of the Uly-Holdrege-Coly association and their relation to parent materials.**

Minor soils in this association are mainly in the Hall, Coly, Hobbs, Fillmore, Scott, Anselmo, and Hersh series. Hall soils are on the tableland at about the same elevation as Holdrege soils. Coly soils are on hillsides that slope to drainageways. Hobbs soils occupy low areas near drains and also are on foot slopes below Holdrege soils. Fillmore and Scott soils are in small depressions on the tablelands. Anselmo and Hersh soils occupy low ridges that extend across the tableland.

Most of the acreage of the Holdrege-Hord-Uly association is cultivated. Grain sorghum and winter wheat are the principal crops grown under dryland management. The wheat is raised under a fallow system. Some of the cultivated soils are irrigated. Corn, grain sorghum, and alfalfa are the principal irrigated crops. Some of the acreage is in native grass and is used for range.

This association is one of the best in the county for growing cultivated crops. Irrigation is an important practice and the crops respond well to the added water. Good potential exists for increasing the acreage under irrigation. Lack of sufficient moisture and soil erosion are the main hazards where the soils are dryfarmed. Maintaining fertility and efficient water management are the main concerns where the soils are irrigated. Runoff is slow or medium on the tablelands and medium or rapid on the side slopes of drainageways.

Farms in the Holdrege-Hord-Uly association average about 480 acres in size. They generally are diversified and are of the combination cash grain-livestock type. Most farmers have small cow-calf herds on grazing land. Farm produce is marketed mainly in North Platte but some is transported to Curtis in adjoining Frontier County. Gravel or improved roads are on most section lines.

Somewhat Poorly Drained to Very Poorly Drained Soils on Bottom Lands

Two soil associations are in this group. They consist of nearly level to gently sloping, silty, loamy, and sandy soils and land types.

7. Lawet-Elsmere-Wet alluvial land association

Deep, nearly level to gently sloping, somewhat poorly drained to very poorly drained, silty and sandy soils on bottom lands

This association consists of long, narrow areas of bottom lands in the valleys of the North Platte and Platte Rivers (fig. 6). Most of these bottom lands are nearly level to gently sloping, but some have a low hummocky topography. Depth to the water table is less than 5 feet in most of the

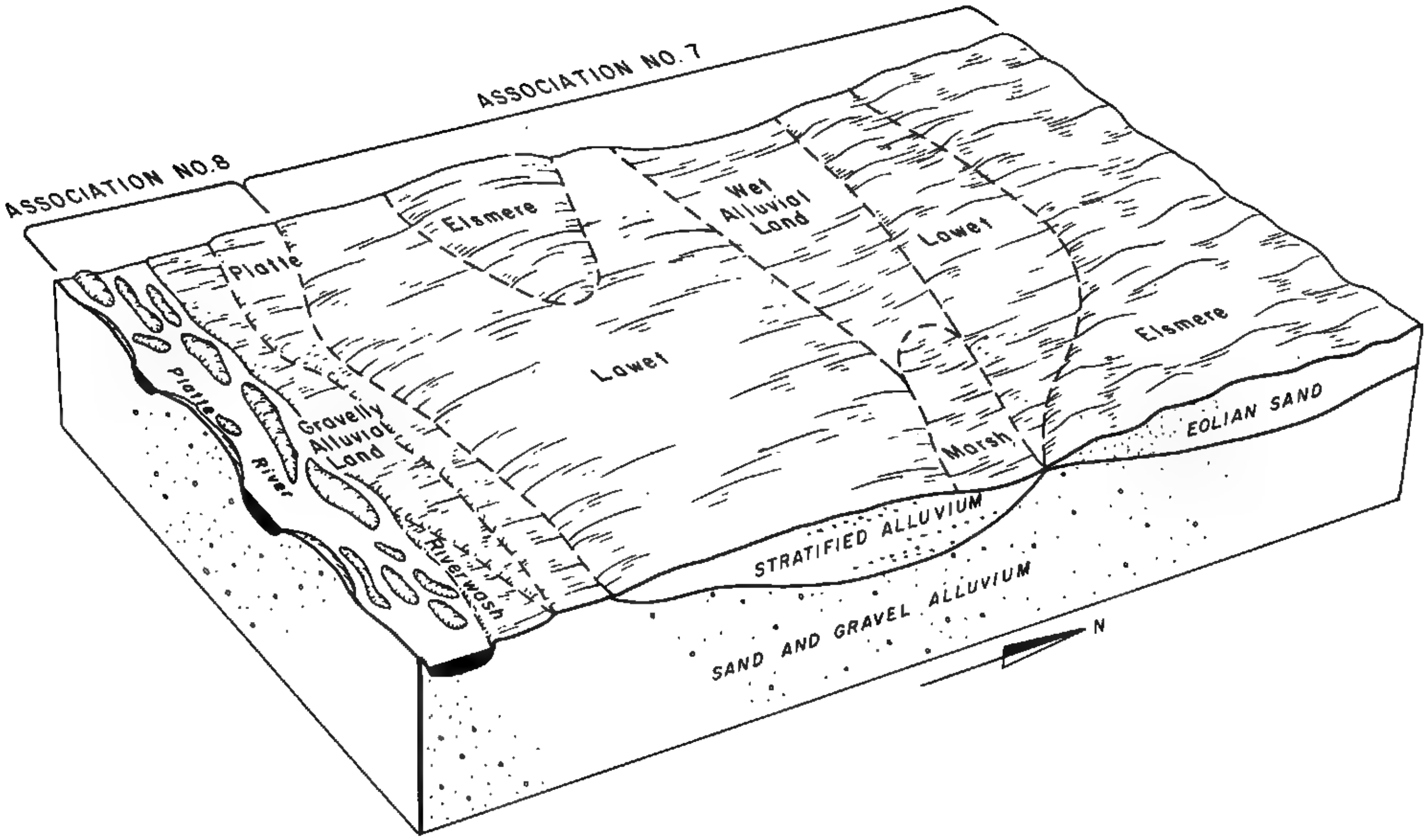

Figure 6.—**Soils of the Lawet-Elsmere-Wet alluvial land association and the Gravelly alluvial land-Platte-Riverwash association and their relation to parent materials.**

association but is as much as 10 feet or a little more at the highest elevations. Water is slightly above the surface in some places.

The Lawet-Elsmere-Wet alluvial land association occupies about 1.5 percent of the county. Lawet soils make up about 28 percent of the association, Elsmere soils 26 percent, and Wet alluvial land 18 percent. The remaining 28 percent is minor soils and land types.

Lawet soils occupy some of the lowest parts of the landscape. They are deep, poorly drained to somewhat poorly drained, and nearly level. The surface layer of these soils generally is fine sandy loam or silt loam but is loam in places. The transition layer is silt loam, and the underlying material is silt loam. Below a depth of 40 inches, it is commonly stratified with coarser and finer textured soil materials. These soils are calcareous throughout the profile.

Elsmere soils are at higher elevations than Lawet soils and commonly are in areas adjacent to the rolling sandhills. They are deep, somewhat poorly drained, and nearly level to gently sloping. The surface layer of these soils is generally loamy fine sand but is loamy sand or sandy loam in places. The transition layer is fine sand or loamy fine sand, and the underlying material is fine sand commonly stratified with layers of loamy fine sand, sandy loam, or loam.

Wet alluvial land occupies low swales in the landscape. It is nearly level and very poorly drained. The surface layer is fine sandy loam that has layers of mucky silty clay loam in the upper 3 feet of the soil in places. The upper part of the underlying material is loam and sandy loam; the lower part is sand.

Minor soils in this association are mainly in the Anselmo, Dunday, Valentine, Platte, Wann, and Loup series. Two land types—Marsh and Muck—also are included. The Anselmo, Dunday, and Valentine soils occupy the highest elevations in the area. Platte soils are in low areas and abandoned river channels. Wann soils are at slightly higher elevations than Lawet soils and at lower elevations than Elsmere soils. Loup soils are along narrow drainageways that cross the association or in depressions at lower elevations than Elsmere soils. Marsh is in the lowest elevations in the association, and Muck is commonly adjacent to Marsh at slightly higher elevations.

About 80 percent of the acreage of the Lawet-Elsmere-Wet alluvial land association is in native grass and is used for range and hay. The remainder is cultivated. Alfalfa is the principal crop. About one-half of the cultivated acreage is irrigated.

The high water table limits the use of the land in this association and also the choice of crops. Soil blowing and wetness are the main hazards where the soils are cultivated. Proper range use and a planned grazing system are needed on the large areas of native grass.

Farms and ranches in the Lawet-Elsmere-Wet alluvial land association range from 160 to 960 acres in size, but most have additional holdings in adjacent associations in the sandhills. The land is used mostly for maintaining cow-calf herds.

Some farms are diversified and grow crops for cash. Most crops, however, are used as winter feed for livestock. U.S. Highway 30, parallel to the Platte River, crosses several areas of the association. Gravel roads are on some section lines.

8. Gravelly alluvial land-Platte-Riverwash association

Shallow and very shallow over mixed sand and gravel, nearly level and very gently sloping, somewhat poorly drained to very poorly drained, sandy and loamy soils on bottom lands

This association consists of low bottom lands in the valleys of the North Platte, South Platte, and Platte Rivers (fig. 6). It includes the river channels. The bottom lands are in the lowest physiographic position and are nearly level to very gently sloping. In places water is above the surface; elsewhere the depth to water is not more than 5 feet.

The Gravelly alluvial land-Platte-Riverwash association occupies about 3 percent of the county. Gravelly alluvial land makes up about 42 percent of the association, Platte soils 31 percent, and Riverwash 15 percent. The remaining 12 percent is minor soils, land types, and areas of water.

Gravelly alluvial land occurs adjacent to the rivers and on islands in the rivers. It is very poorly drained and is nearly level or very gently sloping. The upper 1 to 9 inches of the profile generally is stratified loamy soil material that ranges from clay to sand in texture. This is underlain by mixed sand and gravel. The water table is at or near the surface.

Platte soils are at slightly higher elevations than Gravelly alluvial land. They are shallow over mixed sand and gravel, are nearly level to very gently sloping, and are somewhat poorly drained. The surface and transition layers of these soils are loam, fine sandy loam, or silty clay loam. The upper part of the underlying material is fine sandy loam or very fine sandy loam. Mixed sand and gravel is at a depth of 10 to 20 inches. Soil material above the mixed sand and gravel is calcareous. The water table is at a depth of 2 to 5 feet.

Riverwash consists of islands and sandbars in channels of the rivers. It is very poorly drained and is nearly level or very gently sloping. Riverwash is made up almost entirely of alluvial mixed sand and gravel. The water table is at the same level as the river. When the river is high, Riverwash is flooded.

Minor soils in this association are mainly in the Bankard, Elsmere, Lawet, Lex, and Alda series. All of these soils are at higher elevations than the major soils and land types. Wet alluvial land and Marsh are near the river channels. Small areas of water created by pumping sand from pits are common in this association.

Most of the acreage of the Gravelly alluvial land-Platte-Riverwash association is in native grass or trees. Some of this is used for range. Riverwash and Gravelly alluvial land afford little vegetation for grazing but commonly are used in winter as feeding sites for cattle. A small acreage of Platte soils is cultivated. Alfalfa and bromegrass are the principal crops. This association provides habitat for many species of wildlife.

Soils in this association are marginal for cultivation. They are droughty late in summer when the water table is at its lowest level. Some areas are too wet to be used for range. Such areas have good potential for hunting of waterfowl, quail, and deer and for other recreational uses.

Holdings in this association generally are a part of farms or ranches that are headquartered and located mostly in adjacent associations. Few roads are on section lines in this association, but all areas of the association are within a short distance, generally less than a mile from a paved highway or some gravel or improved road.

Somewhat Poorly Drained Soils on Bottom Lands

Only one association is in this group. It consists of nearly level, silty and loamy soils.

9. Lawet-Wann-Lex association

Deep and moderately deep over mixed sand and gravel, nearly level, somewhat poorly drained, silty and loamy soils on bottom lands

This association consists of long, narrow areas on nearly level bottom lands in the valleys of the North Platte, South Platte, and Platte Rivers. Depth to the water table ranges from 2 to 5 feet.

The Lawet-Wann-Lex association occupies about 4 percent of the county. Lawet soils make up about 54 percent of the association, Wann soils 14 percent, and Lex soils 14 percent. The remaining 18 percent is minor soils and land types.

Lawet soils are at lower elevations than the other major soils in this association. They are deep, somewhat poorly drained, and nearly level. The surface layer generally is silt loam or fine sandy loam but is loam in places. The transition layer is silt loam and the underlying material is silt loam that, below a depth of 40 inches, commonly is stratified with layers of loamy fine sand, fine sandy loam, or clay loam.

Wann soils are at the highest elevations occupied by the major soils in this association. They are deep, somewhat poorly drained, and nearly level. The surface layer generally is fine sandy loam or loam but is loamy fine sand in places. The underlying material is fine sandy loam or loamy fine sand. These soils generally are calcareous throughout the profile.

Lex soils are at lower elevations than Wann soils but at higher elevations than Lawet soils. They are moderately deep over mixed sand and gravel, are somewhat poorly drained, and are nearly level. The surface layer is loam. The upper part of the underlying material ranges from very fine sandy loam to silty clay in texture. Mixed coarse sand and gravel occurs below a depth of about 30 inches. These soils are calcareous to a depth of about 20 inches.

Minor soils of this association are mainly in the Alda, Platte, McCook, Inavale, and Bankard series and in Wet alluvial land and Marsh. Alda and Platte soils are in former river channels or in other low areas that are at about the same elevation as Lex and Wann soils. McCook, Inavale, and Bankard soils occupy slightly higher elevations. Wet alluvial land and small areas of Marsh are in the lowest part of this association.

About three-fourths of the Lawet-Wann-Lex association is cultivated. The rest is in native grass and is used for range or hayland. Corn, alfalfa, and grain sorghum are the principal dryfarmed crops. Much of the cultivated acreage and some pastures are irrigated. Corn and alfalfa are the principal irrigated crops. Trees are common along shallow drains and creeks.

Soils in this association are well suited to cultivation, although flooding and a moderately high water table cause the soils to warm more slowly than better drained soils and wetness delays tillage in spring. Balancing and maintaining the fertility are important management practices on irrigated

land. A planned grazing system and proper range use is needed on most of the native grassland used for grazing. Good potential exists for increasing the acreage under cultivation and that under irrigation. Shallow wells and water diverted from the Platte River to canals provide an abundance of water for irrigation.

Farms average about 320 acres in size within the Lawet-Wann-Lex association but most have additional land in adjacent associations. They generally are diversified. Most operators have cattle, sheep, or hogs as part of their farming operation. Some sell grain for cash. Most of the produce is marketed in North Platte or Sutherland. Good gravel or asphalt roads cross the association.

Well-Drained to Somewhat Poorly Drained Soils on Stream Terraces, Foot Slopes, and High Bottom Lands

Two soil associations are in this group. They consist of nearly level to gently sloping, silty and loamy soils.

10. Cozad-Hord association

Deep, nearly level to gently sloping, well-drained, silty soils on stream terraces and foot slopes

This association consists of nearly level to gently sloping stream terraces and foot slopes (fig. 7) in the valleys of the South Platte River, the Platte River, and Wild Horse Creek.

The Cozad-Hord association occupies about 2 percent of the county. Cozad soils make up about 50 percent of the association and Hord soils 37 percent. The remaining 13 percent is minor soils.

Cozad soils are in broad areas where intermittent upland drainageways terminate on stream terraces. They are also on foot slopes. These soils are deep, well drained, and nearly level to gently sloping. The surface layer generally is silt loam or silty clay loam but is very fine sandy loam in places. The subsoil is silt loam, and the underlying material is silt loam or very fine sandy loam.

Hord soils are on stream terraces. They are deep, well drained, and nearly level or very gently sloping. These soils have a silt loam or fine sandy loam surface layer. The subsoil, to a depth of 60 inches, is silt loam in the upper and lower parts and light silty clay loam in the middle part.

Minor soils in this association are mainly in the Hobbs, Uly, and Hall series. Hobbs soils are in drainageways at low elevations and on foot slopes in Wild Horse Valley. Uly soils occupy breaks from uplands to stream terraces and from stream terraces to bottom lands. They are also on areas bordering drainageways that dissect stream terraces. Hall soils are in concave areas at lower elevations than Cozad and Hord soils.

Much of the acreage of the Cozad-Hord association is cultivated. Corn, alfalfa, and grain sorghum are the principal crops. Most fields are irrigated. Soils on breaks and on side slopes along drainageways are used mainly for range and pasture.

Soil blowing is the main hazard where the soils are cul-

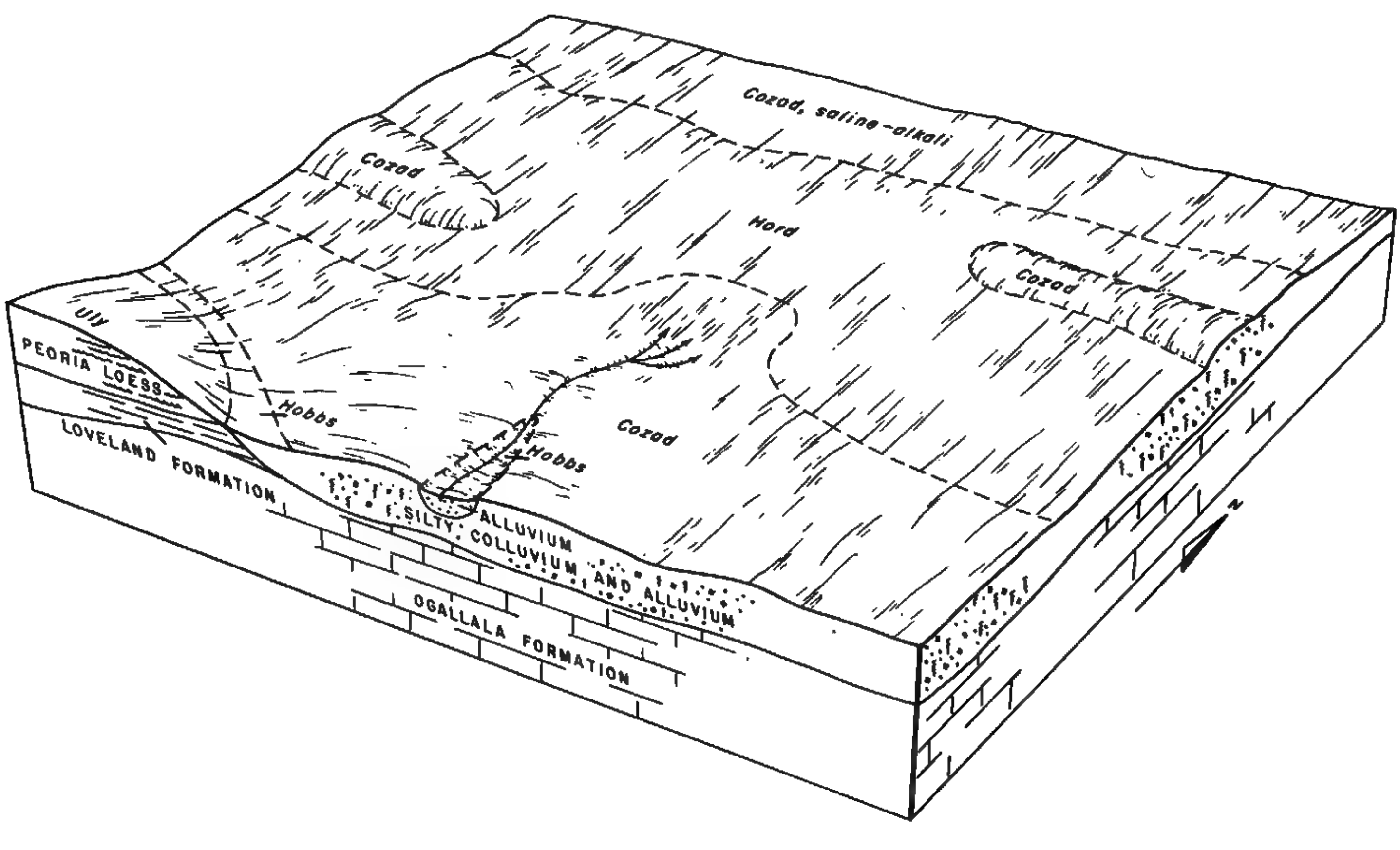

Figure 7.—**Soils of the Cozad-Hord association and their relation to parent materials.**

tivated. Maintaining fertility and an efficient water distribution system are important concerns of management.

Farms in the Cozad-Hord association average about 400 acres in size, but farming operations commonly include land in adjacent associations. Most farms are diversified and are the combination cash grain-livestock type. Moderately large cow-calf operations are common. Farm produce is marketed in North Platte and in Lexington, in adjacent Dawson County. Gravel or improved roads are on nearly all section lines and one asphalt road crosses the association.

11. Caruso-Silver Creek-Humbarger association

Deep, nearly level, well-drained to somewhat poorly drained, loamy and silty soils on high bottom lands

This association occupies nearly level to very gently sloping areas on high bottom lands in the valleys of the North Platte, South Platte, and Platte Rivers. The major soils in the association have similar topographic positions. Depth to the water table ranges from 3 to 10 feet.

The Caruso-Silver Creek-Humbarger association occupies about 2 percent of the county. Caruso soils make up about 25 percent of the association, Silver Creek soils 23 percent, and Humbarger soils 18 percent. The remaining 34 percent is minor soils.

Caruso soils are deep, moderately well drained, and nearly level. Depth to the water table is from 5 to 8 feet. These soils have a loam surface layer and a clay loam or silty clay loam transition layer. The underlying material is clay loam in the upper part, mottled sandy loam and loamy sand in the middle part, and loamy sand and sand in the lower part.

Silver Creek soils are deep, somewhat poorly drained, and nearly level. Depth to the water table is from 3 to 6 feet. The surface layer generally is silt loam but is silty clay loam in places. The subsoil is silty clay loam in the upper part, silty clay in the middle part, and clay loam in the lower part. The underlying material, below a depth of 39 inches, is sand in the upper part and mixed sand and gravel in the lower part.

Humbarger soils are deep, moderately well drained, and nearly level. Depth to the water table ranges from 6 to 10 feet. These soils have a loam surface layer, below which is a transition layer of loam, coarse sandy loam, light silty clay loam, or light clay loam. The underlying material, below a depth of about 40 inches, is calcareous loam in the upper part and mixed sand and gravel in the lower part.

Minor soils in this association are mainly in the McCook, Cass, and Anselmo series. McCook and Cass soils are on high bottom lands. In a few areas the McCook soils are at slightly lower elevations and are affected by alkalinity and salinity. Anselmo soils occupy narrow foot slopes and stream terraces adjacent to the uplands.

Most of the acreage in the Caruso-Silver Creek-Humbarger association is cultivated. Corn, alfalfa, and grain sorghum are the principal crops. Smaller amounts of sugar beets and potatoes also are grown. Most of the crops are irrigated.

This is one of the most intensely farmed associations in the county. Water from shallow wells and surface canals is plentiful for irrigation. The main concerns on the irrigated soils are maintaining fertility and proper water management. Soil blowing is a hazard in some areas. Where the water table is moderately high, the soils are slow to warm in the spring and wetness delays tillage.

Farms in the Caruso-Silver Creek-Humbarger association average about 300 acres in size. They are highly mechanized. A few are the cash-grain type but most are diversified. Some farmers have feedlots for cattle and hogs. Most ranchers have rangeland in the sandhills that is used for summer grazing by their cow-calf herds. Farm produce is marketed mainly in North Platte. Gravel or improved roads are on most section lines.

Descriptions of the Soils

This section describes the soil series and mapping units in Lincoln County. Each soil series is described in detail, and then each mapping unit in that series is described briefly. Unless specifically indicated otherwise, statements about a soil series should be assumed to hold true for all mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which the unit belongs.

An important part of the description of each soil series is the soil profile—that is, the sequence of layers from the surface downward to a depth of 60 inches. For each profile, there are two descriptions. The first is brief and in terms familiar to the layman. The second, more detailed and in technical terms, is for those who need to make thorough and precise studies of the soils.

The profile described generally is representative for mapping units in the series. If the profile of a given mapping unit differs from the one described for the series, the differences are stated in the description of the mapping unit or are apparent in the name of the mapping unit. Unless it is otherwise noted, the colors given in the descriptions are those of a dry soil and the terms for consistence are those of a moist soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Riverwash, for example, does not belong to a soil series but, nevertheless, is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, range site, and windbreak suitability group in which the mapping unit has been placed. The page for the description of each capability unit, range site, and windbreak suitability group is given in the "Guide to Mapping Units" at the back of this survey.

Many of the terms used in describing soils can be found in the Glossary, which immediately precedes the "Guide to Mapping Units." Detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*5*).

The acreage and proportionate extent of each mapping unit are shown in table 1.

Names, descriptions, and boundaries of soils in Lincoln County do not agree fully with those in recently published surveys of adjacent counties. Such differences result from a better knowledge of the soils, modifications in the concept of the soil series, and changes in the intensity of mapping.

Alda Series

The Alda series consists of nearly level, somewhat poorly drained, moderately deep soils underlain by mixed sand and

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Alda soils	3,000	0.2
Anselmo sandy loam, terrace, 0 to 3 percent slopes	1,700	.1
Anselmo sandy loam, terrace, 3 to 5 percent slopes	1,050	.1
Anselmo fine sandy loam, 0 to 3 percent slopes	10,900	.7
Anselmo fine sandy loam, 3 to 5 percent slopes	3,700	.2
Anselmo fine sandy loam, 5 to 9 percent slopes	3,500	.2
Bankard loamy fine sand, loamy subsoil variant	1,350	.1
Blown-out land	1,300	.1
Caruso loam	8,400	.5
Cass fine sandy loam, 0 to 3 percent slopes	1,300	.1
Cass fine sandy loam, calcareous variant	3,050	.2
Coly silt loam, 7 to 9 percent slopes	4,450	.3
Coly silt loam, 9 to 15 percent slopes	6,000	.4
Coly silt loam, 15 to 30 percent slopes	125,200	7.7
Cozad silt loam, 0 to 1 percent slopes	8,200	.5
Cozad silt loam, 1 to 3 percent slopes	3,800	.2
Cozad silt loam, 3 to 7 percent slopes	1,300	.1
Cozad silt loam, saline-alkali	3,300	.2
Cozad silt loam, wet	510	(1)
Cozad silty clay loam	580	(1)
Cozad loam, sandy subsoil variant	1,200	.1
Creighton complex, 7 to 20 percent slopes	3,300	.2
Dix complex, 5 to 30 percent slopes	3,100	.2
Dunday loamy fine sand, 0 to 3 percent slopes	14,500	.9
Dunday-Valentine loamy fine sands, 0 to 5 percent slopes	11,100	.7
Elsmere loamy fine sand, 0 to 3 percent slopes	6,900	.4
Elsmere complex, 0 to 5 percent slopes	1,200	.1
Fillmore complex	1,300	.1
Gravelly alluvial land	17,900	1.1
Hall silt loam, 0 to 1 percent slopes	1,250	.1
Hall silt loam, 1 to 3 percent slopes	4,700	.3
Hall silt loam, terrace	570	(1)
Hersh-Anselmo fine sandy loams, 1 to 3 percent slopes	3,550	.2
Hersh-Valentine loamy fine sands, 0 to 5 percent slopes	12,300	.8
Hersh soils, 3 to 5 percent slopes	18,000	1.1
Hersh soils, 5 to 9 percent slopes	12,900	.8
Hersh and Anselmo soils, 9 to 30 percent slopes	8,400	.5
Hersh and Valentine soils, 5 to 9 percent slopes	3,300	.2
Hobbs fine sandy loam, 0 to 3 percent slopes	1,450	.1
Hobbs fine sandy loam, 3 to 7 percent slopes	1,150	.1
Hobbs silt loam, 0 to 1 percent slopes	1,200	.1
Hobbs silt loam, 1 to 3 percent slopes	1,450	.1
Hobbs silt loam, 3 to 7 percent slopes	2,100	.1
Hobbs and McCook silt loams	9,900	.6
Holdrege fine sandy loam, 0 to 3 percent slopes	1,050	0.1
Holdrege silt loam, 1 to 3 percent slopes	23,900	1.5
Holdrege silt loam, 3 to 7 percent slopes	2,400	.1
Holdrege silt loam, 3 to 7 percent slopes, eroded	37,700	2.3
Holdrege complex, 3 to 7 percent slopes	11,200	.7
Holdrege and Uly silt loams, 7 to 9 percent slopes	3,050	.2
Hord fine sandy loam, 0 to 3 percent slopes	10,500	.7
Hord silt loam, 0 to 1 percent slopes	8,400	.5
Hord silt loam, 1 to 3 percent slopes	24,700	1.5
Hord silt loam, terrace, 0 to 1 percent slopes	11,200	.7
Hord silt loam, terrace, 1 to 3 percent slopes	1,460	.1
Humbarger loam, gravelly substratum	6,200	.4
Inavale loamy fine sand	1,500	.1
Lawet fine sandy loam, drained	1,150	.1
Lawet silt loam	5,500	.3
Lawet silt loam, drained	20,100	1.2
Lawet silt loam, saline-alkali	12,500	.8
Lawet-Slickspot complex	1,500	.1
Lawet loam, gravelly subsoil variant	2,000	.1
Lex loam	5,500	.3
Lex loam, saline-alkali	3,800	.2
Loup complex	1,900	.1
Marsh	2,500	.2
McCook loam	1,600	.1
McCook loam, saline-alkali	4,900	.3
Muck	570	(1)
Platte-Alda complex	15,400	.9
Riverwash	6,500	.4
Rough broken land, loess	111,000	6.9
Scott soils	870	.1
Silver Creek silt loam	7,400	.5
Silver Creek silt loam, saline-alkali	910	.1
Uly silt loam, 3 to 7 percent slopes, eroded	2,450	.2
Uly silt loam, 7 to 9 percent slopes	2,100	.1
Uly-Coly silt loams, 7 to 9 percent slopes	11,800	.7
Uly and Coly silt loams, 9 to 20 percent slopes	34,800	2.2
Valentine fine sand, rolling	781,300	48.4
Valentine loamy fine sand, nearly level	13,100	.8
Valentine loamy fine sand, rolling	6,900	.4
Valentine complex, hilly	57,000	3.5
Vetal fine sandy loam, loamy substratum, 0 to 3 percent slopes	3,100	.2
Wann fine sandy loam	2,900	.2
Wann fine sandy loam, saline-alkali	3,200	.2
Wann loam	3,600	.2
Wet alluvial land	6,300	.4
Water areas less than 40 acres	2,000	.1
Total	1,614,720	100.0
Water areas greater than 40 acres	12,100	

(1) Less than 0.05 percent.

gravel. These soils formed in loamy and sandy alluvium on bottom lands of the Platte Valley. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of 5 feet.

In a representative profile the surface layer consists of about 13 inches of friable calcareous loam that is dark gray in the upper part and gray in the lower part. Beneath this is a very friable, grayish-brown fine sandy loam transition layer about 6 inches thick. The underlying material, to a depth of 30 inches, is light-gray, mottled loamy fine sand. Below this, to a depth of 60 inches, is light-gray mixed sand and gravel.

Alda soils have moderately rapid to rapid permeability, and the underlying sand and gravel has very rapid permeability. These soils have low available water capacity, moderate organic-matter content, and medium natural fertility. They release moisture readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They are also suited to grass and to trees and shrubs in windbreaks. Alda soils provide habitat for wildlife and areas for recreation.

Representative profile of an Alda loam in an area of Alda soils in a cultivated field, 2,376 feet south and 2,112 feet east of the northwest corner of sec. 13, T. 14 N., R. 31 W.:

Ap—0 to 7 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) moist; weak, fine, granular structure; slightly hard, fri-

able; violent effervescence; moderately alkaline; abrupt, smooth boundary.

A12—7 to 13 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak, fine and medium, granular structure; slightly hard, friable; violent effervescence (13 percent lime carbonate); moderately alkaline; clear, smooth boundary.

AC—13 to 19 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; moderately alkaline; gradual, wavy boundary.

C1—19 to 30 inches, light-gray (10YR 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; common, medium, distinct mottles, dark brown (10YR 4/3) and yellowish brown (10YR 5/4) moist; single grained; soft, loose; mildly alkaline; abrupt, wavy boundary.

IIC2—30 to 60 inches, light-gray (10YR 7/2) mixed sand and gravel, grayish brown (10YR 5/2) moist; single grained; loose; neutral.

The A horizon is silt loam, loam, or fine sandy loam that ranges from 8 to 16 inches in thickness. The AC and C1 horizons consist of fine sandy loam stratified with loam and loamy fine sand. Depth to the IIC2 horizon is 20 to 40 inches. Lime carbonate occurs at depths ranging from 0 to 16 inches.

Alda soils are associated in the landscape with Cass, Bankard, Lawet, Wann, Platte, and Lex soils. They are shallower over sand and gravel than Cass, Bankard, Lawet, and Wann soils and deeper over sand and gravel than Platte soils. Alda soils have a higher water table than Cass and Bankard soils. They are coarser textured than Lawet or Lex soils and finer textured than Bankard soils.

Alda soils (0 to 1 percent slopes) (Ad).—This mapping unit occupies low streambed remnants on bottom lands in the Platte Valley. It occurs in areas that range from 10 to 200 acres in size. The surface layer is silt loam, loam, and fine sandy loam.

Included with these soils in mapping were small areas of Bankard loamy fine sand, Platte loam, and Wann fine sandy loam.

Runoff is slow. Because of poor drainage and the moderately high water table, soil wetness is the main hazard. Sometimes the lower areas are flooded after heavy rains. Alda soils are slow to dry out and warm up in spring, when the water table is at its highest level. Tillage commonly is delayed by wetness. These soils can be droughty late in summer, when the water table is at its lowest level. Soil blowing then is a hazard, particularly where these soils are dryfarmed. The mixed sand and gravel in the underlying material has a very low available water capacity.

About two-thirds of the acreage of this mapping unit is in grass that is used for grazing and hay. The remaining acreage is cultivated. Alfalfa, corn, and grain sorghum are the principal crops. Most of the crops are irrigated. Capability units IIIw-4 dryland and IIIw-7 irrigated; Subirrigated range site; windbreak suitability group 2.

***Figure 8.*—Profile of an Anselmo fine sandy loam, a deep, well-drained soil that formed in moderately coarse textured, wind-deposited material.**

Anselmo Series

The Anselmo series consists of deep, well-drained, nearly level to moderately sloping soils on uplands. These soils are in all these positions: foot slopes, stream terraces, and alluvial fans (fig. 8). They formed in moderately coarse textured material that is commonly coarser textured with increasing depth. The soil material was deposited by wind.

In a representative profile the surface layer consists of about 15 inches of very friable fine sandy loam that is dark grayish brown in the upper part and very dark grayish brown in the lower part. Beneath this is a very friable, brown fine sandy loam subsoil about 8 inches thick. The underlying material is pale-brown fine sandy loam to a depth of 32 inches and below this is very pale brown loamy fine sand to a depth of 60 inches.

Anselmo soils have moderately rapid permeability, moderate available water capacity and organic-matter content, and medium natural fertility. They absorb moisture easily and release it readily to plants.

Where the slope is less than 9 percent, these soils are suited to cultivated crops under dryland or irrigation management. Anselmo soils are suited to grass, trees, and shrubs. They provide habitat for wildlife and areas for recreation.

Representative profile of Anselmo fine sandy loam, 0 to 3 percent slopes, in a cultivated field, 2,534 feet south and 100 feet east of the northwest corner of sec. 15, T. 16 N., R. 28 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak,

medium and coarse, granular structure; soft, very friable; neutral; abrupt, smooth boundary.

A12—7 to 15 inches, very dark grayish-brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak, coarse, granular structure; soft, very friable; neutral; clear, smooth boundary.

B2—15 to 23 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, very friable; neutral; clear, smooth boundary.

C1—23 to 32 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak, medium, subangular blocky structure parting to weak, medium, granular; slightly hard, very friable; mildly alkaline; clear, smooth boundary.

C2—32 to 60 inches, very pale brown (10YR 7/3) loamy fine sand, pale brown (10YR 6/3) moist; massive; soft, loose; mildly alkaline.

The A horizon is typically sandy loam or fine sandy loam but in a few places is loamy fine sand. It ranges from 8 to 18 inches in thickness. The B horizon is fine sandy loam, loam, or silt loam that is 4 to 18 inches thick. Coarser sandy materials commonly occur below depths ranging from 23 to 36 inches. In places a buried soil occurs between depths of 30 and 48 inches. These soils are calcareous in the lower part of some profiles.

Anselmo soils are associated in the landscape with Hersh, Holdrege, Hord, Dunday, and Valentine soils. They have a darker colored A horizon than Hersh soils. Anselmo soils have more sand in the B horizon than Holdrege or Hord soils and less sand in the solum and upper part of the C horizon than Dunday or Valentine soils.

Anselmo sandy loam, terrace, 0 to 3 percent slopes (AfB).—This soil is on low stream terraces, foot slopes, and alluvial fans adjacent to the loamy and sandy uplands. It occurs in areas ranging from 10 to 200 acres in size. The profile of this soil is similar to the one described as representative of the Anselmo series, except the surface layer is slightly more alkaline and is sandy loam. In addition, more small pebbles are scattered throughout the profile.

Included with this soil in mapping were small areas of Anselmo soils that have a slope of 3 to 5 percent and areas of Hord silt loam. Also included were small areas of moderately coarse textured soils that are moderately deep over coarse sand and gravel. Mixed sand and gravel is exposed in a few places.

Runoff is slow. Rainfall generally is inadequate for most dryfarmed crops. Some land grading is needed for gravity irrigation. Soil blowing is a hazard. Maintaining high fertility and improving the organic-matter content are concerns of management.

Most of the acreage of this soil is cultivated and much of this is irrigated. Corn, alfalfa, and grain sorghum are the principal crops. Capability units IIe-3 dryland and IIe-8 irrigated; Sandy range site; windbreak suitability group 3.

Anselmo sandy loam, terrace, 3 to 5 percent slopes (AfC).—This loamy soil is on low stream terraces, foot slopes, and alluvial-colluvial fans adjacent to the loamy and sandy uplands. It occurs in areas that range from 10 to 200 acres in size. The profile of this soil is similar to the one described as representative of the Anselmo series except more pebbles and coarse material are scattered throughout the profile.

Included with this soil in mapping were small areas of Anselmo soil that have a loamy fine sand surface layer and a few small areas of soils that have a loam surface layer. Also included were small, long, narrow areas of shallow and very shallow soils that overlie gravelly material.

Runoff is slow. Lack of sufficient rainfall limits crop production under dryland management in most years. Soil blowing is a hazard where this soil is dryfarmed.

Most of the acreage of this soil is cultivated and much of this is irrigated. Corn, grain sorghum, and alfalfa are the principal crops. Capability units IIIe–3 dryland and IIIe–8 irrigated; Sandy range site; windbreak suitability group 3.

Anselmo fine sandy loam, 0 to 3 percent slopes (AnB).—This loamy soil is in sand-loess transition areas on the uplands and in the sandhills. It occurs in areas that range from 5 to 100 acres in size. The profile of this soil is the one described as representative of the Anselmo series. In some places the subsoil is loam.

Included with this soil in mapping were small areas of Anselmo soils that have a loamy fine sand surface layer and small areas of Dunday loamy fine sand that are at slightly higher elevations.

Runoff is slow. In most years inadequate rainfall limits crop production under dryland management. Soil blowing is the principal hazard where this soil is dryfarmed. Maintaining the fertility and improving the organic-matter content are concerns of management.

About half the acreage of this soil is cultivated and part of this is irrigated. The remaining acreage is in range or has been reseeded to grass. Corn, wheat, and alfalfa are the principal crops. Capability units IIe–3 dryland and IIe–8 irrigated; Sandy range site; windbreak suitability group 3.

Anselmo fine sandy loam, 3 to 5 percent slopes (AnC).—This soil is in sand-loess transition areas and on concave foot slopes of the uplands and in the sandhills. It occurs in areas that range from 5 to 100 acres in size. The profile of this soil is similar to the one described as representative of the Anselmo series, except coarse-textured material is closer to the surface. In places the subsoil is loam or silt loam.

Runoff is slow. Inadequate rainfall limits production in most years. Soil blowing is the principal hazard in using this soil for cultivated crops.

Most of the acreage of this soil is in native range and is used for grazing. Capability units IIIe–3 dryland and IIIe–8 irrigated; Sandy range site; windbreak suitability group 3.

Anselmo fine sandy loam, 5 to 9 percent slopes (AnD).—This soil is in sand-loess transition areas on the uplands and in the sandhills. It occurs in areas that range from 10 to 100 acres in size. The profile of this soil is similar to the one described as representative of the Anselmo series, except the surface layer is thinner and coarse-textured material is nearer the surface. In places the surface layer is light colored.

Included with this soil in mapping were small areas of Uly silt loam that are at slightly lower elevations.

Runoff is medium. Inadequate rainfall limits production in most years. Soil blowing is the principal hazard in using this soil for cultivated crops. The droughty nature of the soil and the need to improve fertility are concerns of management.

Most of the acreage of this soil is in native grass. Small areas are dryfarmed. Wheat is the principal crop. Capability units IVe–3 dryland and IVe–8 irrigated; Sandy range site; windbreak suitability group 3.

Bankard Variant

This variant consists of deep, well-drained, nearly level soils that formed in moderately fine textured to coarse-

textured alluvium on bottom lands. Depth to the seasonal high water table ranges from about 6 feet in wet years to about 10 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 15 feet.

In a representative profile the surface layer is loose, grayish-brown loamy fine sand about 10 inches thick. The underlying material beneath this is light-gray loamy fine sand, light-gray fine sand, light-gray fine sandy loam, and very pale brown coarse sand and fine gravel in the upper 18 inches. Older buried soils, consisting of very dark gray to gray silty clay loam and grayish-brown gravelly loam, make up the lower part of the underlying material to a depth of 60 inches.

Bankard variant soils have rapid permeability in the upper part of the profile and moderate permeability in the lower part. Available water capacity, organic-matter content, and natural fertility are low. These soils absorb moisture easily and release it readily to plants.

These soils are marginally suited to cultivated crops under dryland or irrigated management. They are suited to grass, trees, and shrubs. Bankard variant soils provide habitat for wildlife and areas for recreation.

Representative profile of Bankard loamy fine sand, loamy subsoil variant, in a cultivated field, 686 feet south and 100 feet east of the northwest corner of sec. 32, T. 14 N., R. 31 W.:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; single grained; soft, loose; violent effervescence; moderately alkaline; abrupt, smooth boundary.

C1—10 to 16 inches, light-gray (10YR 7/2) loamy fine sand, brown (10YR 5/3) moist; single grained; soft, loose; violent effervescence; moderately alkaline; abrupt, smooth boundary.

C2—16 to 20 inches, light-gray (10TR 7/2) fine sand, light brownish gray (10YR 6/2) moist; single grained; soft, loose; violent effervescence; moderately alkaline; abrupt, smooth boundary.

C3—20 to 24 inches, light-gray (10YR 7/2) fine sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable; violent effervescence; moderately alkaline; abrupt, smooth boundary.

C4—24 to 28 inches, very pale brown (10YR 8/3) coarse sand and fine gravel, very pale brown (10YR 7/3) moist; massive; loose; mildly alkaline; abrupt, smooth boundary.

IIA11b—28 to 37 inches, very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; massive; hard, friable; violent effervescence; moderately alkaline; clear, smooth boundary.

IIA12b—37 to 58 inches, gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; common, medium, distinct mottles, reddish brown (5YR 4/4) moist; massive; hard, friable; mildly alkaline; abrupt, smooth boundary.

IIIC5—58 to 60 inches, grayish-brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable; mildly alkaline.

The A horizon is 5 to 10 inches thick and is grayish brown to dark grayish brown. Depth to the IIAb horizon is 26 to 38 inches. These soils generally are calcareous throughout their profiles but in some places the upper part of the C horizon lacks lime.

Bankard variant soils are associated in the landscape with Gravelly alluvial land and Platte, Alda, Lawet, and Cass soils. They are better drained than Gravelly alluvial land or Platte, Alda, or Lawet soils and are deeper to sand and gravel than Gravelly alluvial land or Platte and Alda soils. The upper part of the profile of Bankard variant soils is coarser textured than the profile of Lawet or Cass soils.

Bankard loamy fine sand, loamy subsoil variant (0 to 1 percent slopes) (Bk).—This soil formed in sandy and loamy alluvial deposits on bottom lands in the Platte Valley and in the valleys of Whitehorse and Red Willow Creeks. In places the loamy material is lacking. This soil occurs in small areas, some of which are long and narrow.

Included with this soil in mapping were small areas of Cass fine sandy loam, calcareous variant, that are at slightly lower elevations.

Runoff is very slow. Soil blowing is the principal hazard. This soil is difficult to work because of the soft consistence of the surface layer. The low available water capacity is a limitation where the soil is cultivated under either dryland or irrigation management.

Most of the acreage of this soil is cultivated and a small part is irrigated. Alfalfa is the principal crop. Capability units IVe–5 dryland and IVe–11 irrigated; Sandy Lowland range site; windbreak suitability group 3.

Blown-Out Land

Blown-out land (3 to 15 percent slopes) (Bo) is an excessively drained land type that occurs in the sandhills, mainly in cup-shaped hollows or depressions blown out by wind. This land type also occurs in denuded areas, mostly around windmills where vegetation is sparse or lacking, and in areas on the leeward side of blow-outs where the grass is covered by sand. Areas of Blown-out land range from 10 to 60 acres in size. In some places an area of this land type consists of a single blow-out; in others it consists of several closely grouped blow-outs. As the soil material shifts or is blown out, a blow-out continues to erode and can change size and shape in a short period of time.

The soil material in Blown-out land is fine sand throughout the profile. Valentine soils were formerly in areas of this land type. Permeability is rapid, and the available water capacity, organic-matter content, and natural fertility are low. Because soil blowing is a very severe limitation, establishing adequate surface cover is the primary concern of management.

Where suitable vegetation becomes established, Blown-out land is used by cattle for grazing. This land type is not suited to cultivation. To promote revegetation, denuded areas generally are fenced to keep cattle out. Areas of Blown-out land become smaller if managed properly, but become larger if continuous heavy grazing is permitted on surrounding soils. Capability unit VIIe–5 dryland; Sands range site; windbreak suitability group 10.

Caruso Series

The Caruso series consists of deep, moderately well drained, nearly level soils on bottom lands in the Platte Valley (fig. 9). Depth to the seasonal high water table ranges from about 5 feet in wet years to about 7 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 8 feet.

In a representative profile the surface layer is very friable, grayish-brown loam about 10 inches thick. Beneath this is a 10-inch transition layer of friable, pale-brown clay loam. The upper part of the underlying material, to a depth of 36 inches, is gray to grayish-brown clay loam; the middle part, to a depth of 54 inches, is mottled light brownish-gray to light-gray sandy loam and loamy sand; and the lower part, to a depth of 60 inches, is pale-yellow sand.

Caruso soils have moderately slow permeability and moderate available water capacity. These soils have moderately low organic-matter content and medium natural

Figure 9.—**Profile of Caruso loam, a deep, moderately well drained soil that formed in alluvium.**

fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Caruso soils provide habitat for wildlife and areas for recreation.

Representative profile of Caruso loam in a cultivated field, 1,848 feet south and 150 feet east of the northwest corner of sec. 23, T. 14 N., R. 31 W.:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, subangular blocky structure parting to weak, medium and fine, granular; slightly hard, very friable; moderately alkaline; abrupt, smooth boundary.

AC—10 to 20 inches, pale-brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; hard, friable; slight effervescence; moderately alkaline; clear, smooth boundary.

C1—20 to 31 inches, grayish-brown (10YR 5/2) clay loam, dark gray (10YR 4/1) moist; weak, medium and coarse, subangular blocky structure; very hard, friable; few, soft, accumulations of lime and few lime concretions; slight effervescence; moderately alkaline; clear, smooth boundary.

C2ca—31 to 36 inches, gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; common fine distinct mottles, yellowish brown (10YR 5/6) moist; weak, medium, subangular blocky structure; very hard, friable; numerous, soft, lime accumulations and lime concretions; strong effervescence (9 percent lime carbonate); moderately alkaline; abrupt, smooth boundary.

IIC3—36 to 41 inches, light brownish-gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; few, common, distinct mottles, yellowish brown (10YR 5/6) moist; weak, medium, subangular blocky structure; slightly hard, very friable; few, soft, lime accumulations; slight effervescence; moderately alkaline; clear, smooth boundary.

IIC4—41 to 48 inches, light-gray (2.5Y 7/2) loamy sand, light brownish gray (2.5Y 6/2) moist; common, fine, distinct mottles, yellowish brown (10YR 5/6) moist; single grained; soft, loose; few, soft, lime accumulations; violent effervescence; moderately alkaline; clear, smooth boundary.

IIC5g—48 to 54 inches, light-gray (5Y 7/2) loamy sand, pale olive (5Y 6/3) moist; single grained; soft, loose; strong effervescence; moderately alkaline; clear, smooth boundary.

IIC6g—54 to 60 inches, pale-yellow (5Y 7/3) sand, pale olive (5Y 6/3) moist; single grained; loose; neutral.

The A horizon ranges from 7 to 10 inches in thickness. The AC horizon is grayish-brown to pale-brown silty clay loam or clay loam. Depth to lime ranges from 8 to 20 inches.

Caruso soils are associated in the landscape with Humbarger, Cass, drained Lawet, and Silver Creek soils. They have more clay than Humbarger, Cass, and drained Lawet soils and less clay than Silver Creek soils. Caruso soils are better drained than Silver Creek and drained Lawet soils. The B horizon is lacking in Caruso soils but is present in Silver Creek soils.

Caruso loam (0 to 1 percent slopes) (Cb) —This soil is on bottom lands in the Platte Valley, primarily on the flood plain between the channels of the North Platte River and the South Platte River. It occurs in areas that range from 5 to several hundred acres in size.

Included with this soil in mapping were small areas of Lex loam, Silver Creek loam, and the drained Lawet silt loam.

Runoff is slow. Where this soil is dryfarmed, lack of sufficient moisture is the principal limitation and soil blowing is a hazard.

Caruso loam is one of the best soils in Lincoln County for growing crops. Most of the acreage of this soil is cultivated, and much of this is irrigated. Corn and alfalfa are the principal crops. Areas within and adjacent to the city of North Platte are used for industry and home sites. Capability units IIc-1 dryland and I-4 irrigated; Silty Lowland range site; windbreak suitability group 1.

Cass Series

The Cass series consists of deep, well-drained, nearly level to very gently sloping soils that formed in loamy and sandy material on bottom lands in the Platte Valley. Depth to the seasonal high water table ranges from about 7 feet in wet years to about 12 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 15 feet.

In a representative profile the 19-inch surface layer is very friable, dark grayish-brown fine sandy loam in the upper part and very friable, dark-brown sandy loam in the

lower part. Beneath this is a very friable, dark grayish-brown sandy loam transition layer about 7 inches thick. The underlying material is grayish-brown sandy loam to a depth of 30 inches and light brownish-gray loamy sand and sand to a depth of 54 inches. Below this a buried soil composed of grayish-brown fine sandy loam extends to a depth of 60 inches.

Cass soils have moderately rapid permeability and moderate available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Cass soils provide habitat for wildlife and areas for recreation.

Representative profile of Cass fine sandy loam, 0 to 3 percent slopes, in a cultivated field, 1,056 feet north and 100 feet east of the southwest corner of sec. 18, T. 41 N., R. 31 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; soft, very friable; neutral; abrupt, smooth boundary.

A12—9 to 19 inches, dark-brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; weak, medium and coarse, subangular blocky structure parting to weak, fine granular; soft, very friable; mildy alkaline; clear, smooth boundary.

AC—19 to 26 inches, dark grayish-brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure; soft, very friable; mildly alkaline; clear, smooth boundary.

C1—26 to 30 inches, grayish-brown (10YR 5/2) sandy loam, dark brown (10YR 4/3) moist; weak, medium, subangular blocky structure; soft, very friable; neutral; clear, smooth boundary.

C2—30 to 36 inches, light brownish-gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; single grained; soft, loose; neutral; clear, smooth boundary.

C3—36 to 54 inches, light brownish-gray (10YR 6/2) sand, brown (10YR 5/3) moist; single grained; loose; mildly alkaline; abrupt, smooth boundary.

Ab—54 to 60 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; neutral.

The A horizon is typically fine sandy loam or sandy loam but is loamy fine sand in a few places. It ranges from 14 to 22 inches in thickness. The AC horizon is dark grayish-brown to grayish-brown sandy loam or fine sandy loam.

Cass soils are associated in the landscape with Cass calcareous variant, Bankard, Humbarger, and Caruso soils. Lime is lacking in the Cass soils but is present in the Cass calcareous variant. Cass soils are finer textured in the upper part of the profile than Bankard soils. They are coarser textured and better drained than Humbarger and Caruso soils.

Cass fine sandy loam, 0 to 3 percent slopes (CeB).—This soil is on some of the highest elevations of the alluvial flood plain in the Platte Valley between the North Platte River and the South Platte River. It occurs in areas that range from 10 to 200 acres in size. Small areas of this soil are calcareous at the surface. In places clayey material is at a depth of 20 to 40 inches.

Included with this soil in mapping were small areas of Humbarger soils at lower elevations and small areas of Bankard soils at higher elevations. Also included were small areas that have a loamy fine sand surface layer.

Runoff is slow. Inadequate moisture limits the use of this soil for dryfarmed crops. Moisture is retained longer and the available water capacity is greater in areas where the lower horizons include clayey material. Soil blowing is the principal hazard. Phosphorus commonly is lacking. Organic-matter content needs to be improved and maintained.

Most of the acreage of this soil is cultivated and a large part is irrigated. Corn and alfalfa are the principal crops. Capability units IIe-3 dryland and IIe-8 irrigated; Sandy Lowland range site; windbreak suitability group 3.

Cass Variant

The Cass variant consists of deep, moderately well drained, nearly level to very gently sloping soils on bottom lands. These soils are calcareous and loamy. Depth to the seasonal high water table ranges from about 5 feet in wet years to about 8 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 10 feet.

In a representative profile the surface layer is very friable, dark grayish-brown fine sandy loam about 13 inches thick. Beneath this is a 10-inch transition layer of very friable, light brownish-gray sandy loam. The underlying material is light brownish-gray loamy fine sand in the upper 16 inches and light-gray loam in the next 6 inches. Below this, to a depth of 60 inches, is stratified grayish-brown and light brownish-gray silty clay loam and light gray fine sandy loam. The soil is calcareous below a depth of 7 inches.

Cass variant soils have moderately rapid permeability in the upper part and moderately slow permeability in the lower part. They have moderate available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Cass variant soils provide habitat for wildlife and areas for recreation.

Representative profile of Cass fine sandy loam, calcareous variant, in a cultivated field, 1,584 feet west and 100 feet north of the southeast corner of sec. 15, T. 13 N., R. 29 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable; moderately alkaline; abrupt, smooth boundary.

A12—7 to 13 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak, medium and coarse, subangular blocky structure parting to weak, fine, granular; soft, very friable; violent effervescence; moderately alkaline; clear, smooth boundary.

AC—13 to 23 inches, light brownish-gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak, medium and coarse, subangular blocky structure; soft, very friable; violent effervescence (3 percent lime carbonate); moderately alkaline; clear, smooth boundary.

C1—23 to 39 inches, light brownish-gray (10YR 6/2) loamy fine sand, brown (10YR 5/3) moist; weak, medium and coarse, subangular blocky structure; soft, loose; violent effervescence; moderately alkaline; abrupt, smooth boundary.

C2—39 to 45 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable; violent effervescence (8 percent lime carbonate); moderately alkaline; abrupt, smooth boundary.

IIAbg—45 to 51 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; few, medium, distinct mottles, olive brown (2.5Y 4/4) moist; massive; hard, firm; mildly alkaline; clear, smooth boundary.

IIC1g—51 to 56 inches, light brownish-gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable; moderately alkaline; abrupt, smooth boundary.

IIIC2g—56 to 60 inches, light-gray (2.5Y 7/2) fine sandy loam,

light brownish gray (2.5Y 6/2) moist; single grained; slightly hard, very friable; mildly alkaline.

The A horizon ranges from 10 to 20 inches in thickness. The AC horizon is grayish-brown to light brownish-gray fine sandy loam or sandy loam. It is 7 to 11 inches thick. The C horizon ranges widely in texture. Depth to lime is from 0 to 18 inches.

Cass variant soils are associated in the landscape with Cass, Bankard, McCook, Platte, and drained Lawet soils. They are not so leached of carbonates as the typical Cass soils. Cass variant soils have less sand than Bankard soils and have more sand in the C horizon than McCook soils. They lack the mixed sand and gravel in the C horizon that is present in Platte soils and are coarser textured in the C horizon than the drained Lawet soils. Cass calcareous variant soils have a lower water table than Platte soils and are better drained than the drained Lawet soils.

Cass fine sandy loam, calcareous variant (0 to 1 percent slopes) (Cf).—This soil is on bottom lands in the Platte Valley and along streams. It commonly occurs in long, narrow areas that range from 5 to about 100 acres in size. In places clayey layers are at a depth of 24 to 48 inches.

Included with this soil in mapping were small areas of McCook soils at lower elevations and small areas of Bankard soils at higher elevations.

Runoff is slow. Lack of sufficient moisture is a common limitation to cultivating crops under dryland management, especially if shallow-rooted crops are grown. Deep-rooted crops, such as alfalfa, absorb moisture from the zone of capillary water above the water table, which occurs at depths ranging from 5 to 10 feet. Because the available water capacity is only moderate, the soil is droughty where it is dryfarmed. Soil blowing is the principal hazard. A high level of management is needed where this soil is irrigated.

Most of the acreage of this soil is cultivated and a large part is irrigated. Corn and alfalfa are the principal crops. Capability units IIe–3 dryland and IIe–8 irrigated; Sandy Lowland range site; windbreak suitability group 3.

Coly Series

The Coly series consists of deep, well-drained, moderately sloping to steeply sloping soils that formed in loess on uplands.

In a representative profile the surface layer is very friable, grayish-brown silt loam about 5 inches thick. Beneath this is an 8-inch transition layer of very friable, light brownish-gray silt loam. The underlying material is light-gray, calcareous silt loam to a depth of 60 inches.

Coly soils have moderate permeability and high available water capacity. These soils have low organic-matter content and low natural fertility. They absorb moisture easily and release it readily to plants.

These soils are well suited for use as range. Where the slope is not too steep, they can be used for cultivated crops. Coly soils also are suited to trees and shrubs. They provide habitat for wildlife and areas for recreation.

Representative profile of Coly silt loam, 15 to 30 percent slopes, in native range, 360 feet west and 360 feet south of the northeast corner of sec. 28, T. 13 N., R. 30 W.:

A—0 to 5 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable; mildly alkaline; abrupt, smooth boundary.

AC—5 to 13 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; weak, coarse, prismatic structure; soft, very friable; violent effervescence; mildly alkaline; clear, smooth boundary.

C—13 to 60 inches, light-gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; weak, coarse, prismatic structure; soft, very friable; violent effervescence; mildly alkaline.

The A horizon is 4 to 6 inches thick and is grayish brown to light brownish gray. The AC horizon is 4 to 8 inches thick. The C horizon is light gray to pale brown. Depth to calcium carbonate ranges from 0 to 10 inches.

Coly soils are associated in the landscape with Hobbs, Holdrege, Hord, and Uly soils and with Rough broken land, loess. They have a thinner A horizon than any of these soils and have lime nearer the surface. The B horizon that is lacking in Coly soils is present in Hobbs, Holdrege, Hord. and Uly soils. Steep Coly soils are included in Rough broken land, loess.

Coly silt loam, 7 to 9 percent slopes (CoD).—This soil is on breaks of the loess uplands and is in areas that range from 10 to 200 acres in size.

Included with this soil in mapping were small areas of the moderately sloping Holdrege and Uly soils.

Runoff is medium to rapid depending on the amount of cover. Erosion by water is a serious hazard. Lack of sufficient moisture limits production of dryfarmed crops. Soil blowing is a hazard where the surface is not protected. Conserving rainfall and improving the fertility and organic-matter content are concerns of management.

Much of the acreage of this soil is cultivated and most of this is dryfarmed. Wheat and alfalfa are the principal crops. The remaining acreage is in tame or native grass. Some areas that were formerly cultivated have been reseeded to native grass. Capability units IVe–9 dryland and IVe–6 irrigated; Limy Upland range site; windbreak suitability group 5.

Coly silt loam, 9 to 15 percent slopes (CoE).—This soil is on breaks of the loess uplands and occurs in areas that range from 10 to 500 acres in size. It is on smooth slopes at the higher elevations and on steeper side slopes at lower elevations.

Included with this soil in mapping were small areas of Uly silt loam, moderately sloping Holdrege silt loam, and gently sloping Hobbs silt loam.

Runoff is rapid. Generally the areas are too steep and the hazard of erosion by water is too severe to use this soil for cultivated crops. Conserving rainfall is a primary concern of management.

All of the acreage of this soil has been cultivated, but most of this has been reseeded to grass or allowed to revegetate. Only a small acreage is cultivated. Wheat and alfalfa are the principal crops. Capability unit VIe–9 dryland; Limy Upland range site; windbreak suitability group 5.

Coly silt loam, 15 to 30 percent slopes (CoF).—This soil is on steep breaks to valleys and in canyon areas on the loess uplands. It occurs in areas that range from 20 to 2,000 acres in size. The profile of this soil is the one described as representative of the Coly series.

Included with this soil in mapping were areas of Rough broken land, loess, which make up about 20 percent of the mapping unit. Areas of included Uly and Hobbs soils make up another 10 percent. Uly soils are on smooth slopes at lower elevations just above the prominent very steep breaks of broken loess. Hobbs soils are on the bottoms of canyons.

Runoff is rapid. Erosion by water is a very severe hazard. Proper use of grass to provide protection against erosion and maintaining the most desirable kinds of grass are important concerns of management.

Nearly all of the acreage of this soil is in native grass and is used for range. In places sparse stands of redcedar trees grow in the bottoms and on the sides of canyons. Capability unit VIe–9 dryland; Limy Upland range site; windbreak suitability group 10.

Cozad Series

The Cozad series consists of deep, nearly level to gently sloping soils that formed in alluvium or in colluvial-alluvial material on stream terraces and foot slopes and in upland swales. These soils are well drained, except that the saline-alkali and wet phases are somewhat poorly drained.

In a representative profile the surface layer is very friable, dark grayish-brown silt loam about 11 inches thick. The subsoil is a 4-inch layer of very friable, grayish-brown silt loam. Beneath this the underlying material is calcareous very fine sandy loam that is light brownish gray to a depth of 21 inches and pale brown to a depth of 60 inches.

Cozad soils have moderate permeability and high available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigated management. They also are suited to grass and to trees and shrubs in windbreaks. Cozad soils provide habitat for wildlife and areas for recreation.

Representative profile of Cozad silt loam, 0 to 1 percent slopes, in a cultivated field, 1,584 feet west and 165 feet south of the northeast corner of sec. 2, T. 12 N., R. 29 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; mildly alkaline; abrupt, smooth boundary.

A12—6 to 11 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; mildly alkaline; clear, smooth boundary.

B—11 to 15 inches, grayish-brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; slightly hard, very friable; numerous, dark worm casts; mildly alkaline; clear, smooth boundary.

C1—15 to 21 inches, light brownish-gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak, medium, subangular blocky structure; slightly hard, very friable; numerous, dark worm casts; violent effervescence; moderately alkaline; gradual, smooth boundary.

C2—21 to 60 inches, pale-brown (10YR 6/2) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline.

The A horizon is typically silt loam or silty clay loam but is very fine sandy loam in places. It is 8 to 18 inches thick and is grayish brown to dark grayish brown. The B horizon is 4 to 12 inches thick and is grayish brown or light brownish gray. The C horizon is light brownish-gray to pale-brown very fine sandy loam or silt loam. Dark-colored buried soils are common below depths from 30 to 42 inches. Depth to calcium carbonate ranges from 9 to 24 inches.

Cozad soils are associated with Hord and Hall soils on terraces in the stream valleys and with Holdrege soils in the uplands. They have a thinner A horizon than Hord and Hall soils and a thicker A horizon than Coly soils. Cozad soils have a less clayey B horizon than Holdrege and Hall soils. Lime is leached less deeply in Cozad soils than in Hord or Hall soils.

Cozad silt loam, 0 to 1 percent slopes (CsA).—This soil is mostly on low stream terraces south of the Platte River. It occurs in areas ranging from 20 to 400 acres in size. The largest areas are long and narrow and are adjacent to upland soils. The profile of this soil is the one described as representative of the Cozad series. In a few places the surface layer is more than 20 inches thick.

Runoff is slow. This is one of the best soils in the county for growing crops under either dryland or irrigation management. Insufficient moisture is the principal hazard where the soil is dryfarmed. Maintaining fertility is a concern of management, especially where the soil is irrigated.

Nearly all of the acreage of this soil is cultivated and part of this is irrigated. Corn, alfalfa, grain sorghum, and wheat are the principal crops. Capability units IIc–1 dryland and I–6 irrigated; Silty Lowland range site; windbreak suitability group 1.

Cozad silt loam, 1 to 3 percent slopes (CsB).—This soil is mainly on foot slopes south of the Platte River. It also occurs in Wildhorse Valley and in a few other upland valleys. It occurs in areas ranging from 20 to 200 acres in size. The largest areas are long and narrow and are adjacent to uplands. The profile of this soil is similar to the one described as representative of the Cozad series, except that the average thickness of the surface layer is slightly less. In places thin layers of fine sandy loam material occur directly beneath the surface layer.

Included with this soil in mapping were small areas of Hord soils.

Runoff is slow to medium. Erosion by water and soil blowing are the principal hazards. Moisture generally is insufficient for dryfarmed crops. Maintaining fertility is an important concern of management where the soil is irrigated and also where the surface layer has been removed during land leveling. Zinc and iron deficiencies are common in the leveled areas.

Most of the acreage of this soil is cultivated and a large part is irrigated. Corn, alfalfa, grain sorghum, and wheat are the principal crops. Capability units IIe–1 dryland and IIe–6 irrigated; Silty range site; windbreak suitability group 4.

Cozad silt loam, 3 to 7 percent slopes (CsC).—This soil occurs on colluvial foot slopes and alluvial fans in the Platte Valley and in Wildhorse Valley and in areas adjacent to intermittent drainageways. It also is on foot slopes of upland valleys. These areas are commonly long and narrow and range from 15 to 150 acres in size. The profile of this soil is similar to the one described as representative of the Cozad series, except that the average thickness of the surface layer is slightly less. In places the surface layer is dark grayish brown and extends to a depth of 20 inches or more.

Included with this soil in mapping were small areas of Cozad soils that are at lower elevations and are subject to flooding.

Runoff is medium. Erosion by water is a severe hazard. Soil blowing is a hazard where the cover is inadequate. This soil is not as well suited to gravity irrigation as the Cozad soils that have less gradient. Conserving water and maintaining fertility are important concerns of management where this soil is irrigated.

Most of the acreage of this soil is cultivated and about half is irrigated. Corn, alfalfa, and grain sorghum are the principal crops. Capability units IIIe–1 dryland and IIIe–6 irrigated; Silty range site; windbreak suitability group 4.

Cozad silt loam, saline-alkali (0 to 1 percent slopes) (Ct).—This silty soil is on low stream terraces and in transition areas between bottom lands and low stream terraces. It occurs in irregularly shaped areas ranging from 10 to 100 acres in size. This soil has a profile similar to the one described as representative of the Cozad series, except that the surface layer is about 4 inches thicker and ranges from moderately alkaline to very strongly alkaline in reaction. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the

driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet.

Included with this soil in mapping were small areas of Hord soils and a few small areas of Slickspots, which are high in exchangeable sodium. Also included were a few somewhat poorly drained areas having a high water table.

Runoff is slow. Alkalinity is the main hazard in using this soil. In some areas it has destroyed the desirable soil structure, making the soil difficult to till. Stands of most crops are difficult to establish where the soil is very strongly alkaline. The availability of soil nutrients is a concern of management. Excessive wetness is a concern in places.

Most of the acreage of this soil is cultivated and part of this is irrigated. Alfalfa, corn, and grain sorghum are the principal crops. Sugar beets are grown in some areas. Alfalfa is the main dryfarmed crop. The more alkaline areas are used mostly for native range or for irrigated pasture. Capability units IVs-1 dryland and IIIs-6 irrigated; the strongly and very strongly alkaline parts are in the Saline Subirrigated range site, the moderately alkaline part is in the Subirrigated range site; windbreak suitability group 8.

Cozad silt loam, wet (0 to 1 percent slopes) (Cu).—This soil is mostly on low stream terraces south of the Platte River. It occurs in areas ranging from 5 to 80 acres in size. The profile of this soil is similar to the one described as representative of the Cozad series, except that the lower part of the profile has yellowish-brown mottles caused by the high water table. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of 5 feet.

Included with this soil in mapping were small areas where the water table is below a depth of 5 feet.

Runoff is slow. The principal limitation in using this soil is excessive wetness, which retards tillage early in spring.

Nearly all the acreage of this soil is cultivated and a small part is irrigated. Alfalfa and corn are the principal crops. Capability units IIw-4 dryland and IIw-6 irrigated; Subirrigated range site; windbreak suitability group 2.

Cozad silty clay loam (0 to 1 percent slopes) (Cv).—This soil is in slight depressions on low stream terraces. It occurs in areas ranging from 10 to 200 acres in size. The profile of this soil is similar to the one described as representative of the Cozad series, except that the surface layer is thinner and is silty clay loam.

Included with this soil in mapping were small areas that have a silt loam surface layer and areas that have a surface layer thicker than 20 inches.

Runoff is slow. Insufficient moisture is the principal hazard where this soil is dryfarmed. Maintaining fertility and improving the organic-matter content are concerns of management.

All of the acreage of this soil is cultivated and most areas are irrigated. Corn, alfalfa, grain sorghum, and wheat are the principal crops. Capability units IIc-1 dryland and I-3 irrigated; Silty Lowland range site; windbreak suitability group 1.

Cozad Variant

The Cozad variant consists of deep, well-drained, nearly level to very gently sloping soils on colluvial-alluvial fans in upland swales and valleys. These soils are mostly in Wildhorse Valley and in the sandy loess transition areas.

In a representative profile the surface layer is friable, dark grayish-brown loam about 9 inches thick. The subsoil is a 4-inch layer of friable, grayish-brown loam. Beneath this the underlying material is light brownish-gray very fine sandy loam to a depth of 32 inches and light-gray fine sandy loam to a depth of 60 inches.

Cozad variant soils have moderate to moderately rapid permeability and high available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass and to trees and shrubs in windbreaks. Cozad variant soils provide habitat for wildlife and areas for recreation.

Representative profile of Cozad loam, sandy subsoil variant, in a cultivated field, 2,376 feet south and 100 feet east of the northwest corner of sec. 2, T. 15 N., R. 26 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; slightly hard, friable; mildly alkaline; clear, smooth boundary.

B—9 to 13 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; slightly hard, friable; mildly alkaline; clear, smooth boundary.

C1—13 to 32 inches, light brownish-gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak, medium, subangular blocky structure; soft, friable; mildly alkaline; clear, smooth boundary.

C2—32 to 60 inches, light-gray (10YR 7/2) fine sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable; strong effervescence; moderately alkaline.

The A horizon is typically loam but in places is silty clay loam or very fine sandy loam. It is 7 to 14 inches thick and is grayish brown to dark grayish brown. The B horizon is 4 to 10 inches thick and is grayish brown to light brownish gray. The C horizon is mainly light brownish-gray to light-gray very fine sandy loam or silt loam. Dark, weakly developed soils are common between depths of 24 to 36 inches, and thin sandy layers occur below depths of 24 inches in places. Lime generally is leached below a depth of 30 inches.

Cozad variant oils are associated in the landscape with Hersh, Valentine, and Anselmo soils. They have a thicker A horizon than Hersh or Valentine soils. Cozad variant soils contain more silt than any of the associated soils and less sand than Valentine soils. They are finer textured in the C1 horizon than Hersh soils. Lime occurs below a depth of 30 inches in the Cozad variant soils but generally is lacking in the associated soils.

Cozad loam, sandy subsoil variant (0 to 2 percent slopes) (Cx).—This soil is on colluvial-alluvial fans in upland swales and valleys. In small areas the surface layer is silty clay loam. Included with this soil in mapping were a few areas of nearly level Anselmo soils.

Runoff is slow. Lack of adequate moisture is the principal hazard where this soil is dryfarmed. Soil blowing is a hazard where cover is inadequate. Maintaining the organic-matter content and high fertility are concerns of management.

Most of the acreage of this soil is cultivated and more than half is irrigated. Corn, alfalfa, and grain sorghum are the principal crops. Capability units IIc-1 dryland and I-6 irrigated; Silty range site; windbreak suitability group 1.

Creighton Series

The Creighton series consists of deep, well-drained, moderately sloping to steep soils on uplands. These soils formed mainly in materials that weathered from bedrock consisting of limy siltstone and limy sandstone.

In a representative profile the surface layer is friable, grayish-brown to dark grayish-brown loam about 8 inches thick. The subsoil is an 8-inch layer of friable, brown loam. Beneath this the underlying material is very pale brown and pinkish gray loam to a depth of 60 inches. Fragments of limy siltstone and sandstone occur between depths of 24 and 32 inches.

Creighton soils have moderate permeability and high available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to grass, trees, and shrubs. They provide habitat for wildlife and areas for recreation. Creighton soils are not suited to the commonly grown cultivated crops because they are too steep.

Representative profile of Creighton loam in an area of Creighton complex, 7 to 20 percent slopes, in a cultivated field, 528 feet south and 180 feet west of the northeast corner of sec. 22, T. 13 N., R. 31 W.:

Ap—0 to 5 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, prismatic structure parting to weak, fine and medium, granular; soft, friable; mildly alkaline; abrupt, smooth boundary.

A12—5 to 8 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable; mildly alkaline; clear, smooth boundary.

B2—8 to 16 inches, brown (10YR 7/3) loam, dark brown (10YR 4/3) moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable; worm casts; mildly alkaline; clear, wavy boundary.

C1—16 to 24 inches, very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak, medium, subangular blocky structure; slightly hard, friable; violent effervescence (3 percent calcium carbonate); moderately alkaline; clear, wavy boundary.

C2—24 to 32 inches, pinkish-gray (7.5YR 7/2) loam, light brown (7.5YR 6/4) moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable; siltstone and sandstone fragments; violent effervescence (16 percent calcium carbonate); moderately alkaline; gradual, wavy boundary.

C3—32 to 60 inches, pinkish-gray (7.5YR 7/2) loam, light brown (7.5YR 6/2) moist; massive; slightly hard, friable; violent effervescence (13 percent calcium carbonate); moderately alkaline.

The A horizon is typically loam but is very fine sandy loam in places. It is 8 to 18 inches thick. The B2 horizon, which is 6 to 12 inches thick, is calcareous on moderately steep slopes and noncalcareous on smooth, moderate slopes. The C horizon has a lime carbonate content ranging from 3 to 30 percent below depths of 15 to 30 inches. Creighton soils in Lincoln County are in an area of higher precipitation than occurs in the defined range for the Creighton series.

Creighton soils are associated in the landscape with Anselmo, Hersh, Coly, Uly, and Dix soils. They contain more sand than Anselmo or Hersh soils and less silt than Coly or Uly soils. Creighton soils have a thicker solum than Coly or Dix soils. The B horizon present in Creighton soils is lacking in Coly soils. Sand and gravel is lacking in the C horizon in Creighton soils but is present in Dix soils.

Creighton complex, 7 to 20 percent slopes (CzE).—Soils in this large complex are on the lower parts of upland breaks between the valleys of the North Platte and South Platte Rivers. They also are on the north-facing slopes of upland breaks south of the Platte River. These soils are in areas ranging from 20 to 600 acres in size. About 60 percent of the complex is Creighton loam, which occupies the lowest elevations in the mapping unit. About 15 percent consists of loamy soils that are 20 to 40 inches deep over consolidated but slightly weathered limy sandstone. About 20 percent is made up of shallower loamy soils that are 10 to 20 inches deep over consolidated sandstone. The remaining 5 percent consists of very shallow soils and exposed bedrock. Small areas of soils in this unit formed in loess.

Runoff is rapid. Erosion by water is the principal hazard. Rill and sheet erosion are very severe where vegetation has been destroyed. On the south side of the Platte Valley these soils are too steep to be cultivated but can be used for building sites if they are reshaped. In places where they are severely cut and reshaped, leaving adequate material for topsoil and quickly establishing a vegetative cover are concerns of management.

Most of the acreage of these soils is in native range. Some areas are used for homesites. Capability unit VIe-1 dryland; Silty range site; windbreak suitability group 4.

Dix Series

The Dix series consists of excessively drained, gently sloping to steep soils that are shallow over mixed sand and gravel (fig. 10). These soils are on upland breaks between the North Platte and South Platte Rivers and along Birdwood Creek.

In a representative profile the surface layer is very friable, dark grayish-brown sandy loam about 8 inches thick. Beneath this is an 8-inch transition layer of very friable, grayish-brown gravelly sandy loam. The underlying material is very pale brown coarse sand and gravel to a depth of 60 inches. Pebbles are scattered throughout the profile.

Dix soils have moderately rapid permeability in the upper part and very rapid permeability in the underlying material. These soils have very low available water capacity, low organic-matter content, and low natural fertility. They absorb moisture easily and release it readily to plants, but only a small amount of moisture can be stored for plant use.

These soils are suited to grass. They provide habitat for wildlife and areas for recreation. Dix soils are not suited to the commonly grown crops or to trees and shrubs because they are too droughty.

Representative profile of Dix sandy loam in an area of Dix complex, 5 to 30 percent slopes, in native range, 1,584 feet south and 60 feet east of the northwest corner of sec. 20, T. 14 N., R. 33 W.:

A—0 to 8 inches, dark grayish-brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; soft, very friable; few pebbles; neutral; clear, smooth boundary.

AC—8 to 16 inches, grayish-brown (10YR 5/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; soft, very friable; neutral; clear, wavy boundary.

C—16 to 60 inches, very pale brown (10YR 7/3) coarse sand and gravel, pale brown (10YR 6/3) moist; single grained; loose; neutral.

The A horizon ranges from 7 to 11 inches in thickness. The AC horizon is typically gravelly sandy loam or sandy loam but is loam in places. It is 4 to 10 inches thick and is grayish brown to dark grayish brown. Lime carbonate is present in some profiles just above the C horizon and some pebbles are coated with lime. Dix soils in Lincoln County are in an area of higher precipitation than occurs in the defined range for the Dix series.

Dix soils are associated in the landscape with Hersh, Anselmo, Creighton, and Coly soils. They are shallow over mixed sand and gravel whereas the associated soils are deep and lack sand and gravel in the C horizon.

Dix complex, 5 to 30 percent slopes (DbF).—This large complex consists of loamy soils on upland breaks and occurs in areas ranging from 20 to 500 acres in size. About

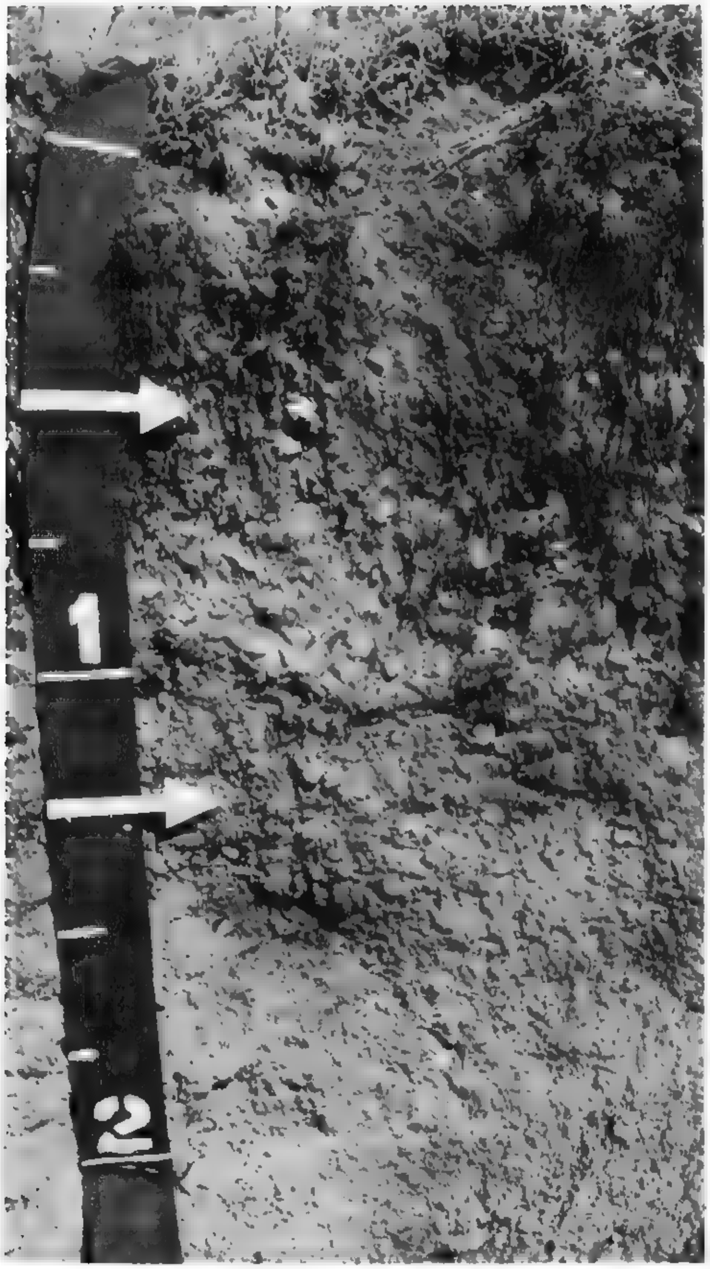

Figure 10.—**Profile of Dix sandy loam, a shallow, excessively drained soil over mixed sand and gravel.**

50 percent of the complex is Dix sandy loam on side slopes of drainageways. About 10 percent consists of Hersh and Anselmo fine sandy loams on convex parts of the landscape. About 20 percent is a loamy soil that is 20 to 40 inches deep over sand and gravel. The remaining 20 percent is a very shallow soil that is less than 10 inches deep over sand and gravel. In places gravel is at the surface.

Included with these soils in mapping were a few small areas of Uly and Valentine soils and small outcrops of limestone of the Ogallala Formation.

Little runoff occurs from areas of this complex. The shallow coarse gravelly substratum limits not only the depth to which roots can penetrate but also the available water capacity of the overlying soils. Droughtiness is such a severe hazard that these soils are best suited to native grass.

Nearlv all of the acreage of this complex is used for range. Capability unit VIs-4 dryland; Shal ow to Gravel range site; windbreak suitability group 10.

Dunday Series

The Dunday series consists of deep, somewhat excessively drained, nearly level to gently slop'ng soils in dry valleys, swales, and foot slopes in the sandhills and in the transition area between the sandhills and loess-mantled uplands.

In a representative profile the surface layer is loose, grayish-brown loamy fine sand about 15 inches thick. Beneath this is a 6-inch transition layer of brown loamy fine sand. The underlying material, to a depth of 60 inches, consists of pale-brown and brown loamy fine sand.

Dunday soils have rapid permeability, low available water capacity, low organic-matter content, and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are marginally suited to cultivated crops under dryland or irrigation management. They are suited to grass, trees, and shrubs, and they provide habitat for wildlife and areas for recreation.

Representative profile of Dunday loamy fine sand, 0 to 3 percent slopes, in native range, 2,054 feet north and 100 feet west of the southeast corner of sec. 17, T. 15 N., R. 30 W.:

A—0 to 15 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, loose; neutral; clear, smooth boundary.

AC—15 to 21 inches, brown (10YR 5/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak, fine and medium, subangular blocky structure; soft, loose; neutral; clear, smooth boundary.

C1—21 to 31 inches, pale-brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; weak, fine and medium, subangular blocky structure; soft, loose; neutral; abrupt, smooth boundary.

C2—31 to 60 inches, brown (10YR 5/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grained; soft, loose; mildly alkaline.

The A horizon is grayish brown to dark grayish brown. Dunday soils are typically loamy fine sand to a depth of 20 to 60 inches, but in places are loamy sand. The C2 horizon is fine sand in places. Ab horizons of dark-colored loam or sandy loam are common between depths of 30 and 50 inches.

Dunday soils are associated in the landscape with Anselmo, Hersh, Vetal, and Valentine soils. They have a sandier solum than Anselmo, Hersh, and Vetal soils and are finer textured than the Valentine soils. Dunday soils have a thinner A horizon than Vetal soils and a thicker A horizon than Hersh or Valentine soils.

Dunday loamy fine sand, 0 to 3 percent slopes (DuB).—This soil is in the sandhills and in the transition area between the sandhills and loess-mantled uplands. It occurs in areas ranging from 20 to 200 acres in size. The profile of this soil is the one described as representative of the Dunday series. In some places the surface layer is loamy sand, and in other places loamy material is below a depth of 3 feet. A wind-deposited, light-colored loamy fine sand overlies the original darker colored surface layer in some areas.

Included with this soil in mapping were small areas of Anselmo fine sandy loam in lower elevations and small areas where lime carbonate is at a depth of 10 to 20 inches.

Runoff is slow. However, moisture is lacking for dryland crops in some years because this soil has a low available

water capacity. Where this soil is dryfarmed and its surface is unprotected, soil blowing is a severe limitation. Maintaining the organic-matter content and fertility are concerns of management.

Much of the acreage of this soil is in native range. About one-third of the acreage has been cultivated, and part of this is irrigated. Corn and alfalfa are the principal crops. Capability units IVe–5 dryland and IIIe–11 irrigated; Sandy range site; windbreak suitability group 3.

Dunday-Valentine loamy fine sands, 0 to 5 percent slopes (DvC).—This soil complex occurs in swales in the sandhills. About 60 percent of the complex is Dunday loamy fine sand, which is mostly at lower elevations; 25 percent is Valentine loamy fine sand, which is at higher elevations; and the remaining 15 percent consists of Anselmo and Hersh soils that have a loamy fine sand surface layer. The profiles of the Dunday and Valentine soils are similar to those given for their respective series. In small areas, however, the surface layer is more than 20 inches thick.

Runoff is slow. Soils in this complex are droughty because they have a low available water capacity. Where these soils are dryfarmed, soil blowing is the principal limitation. Where they are in native grass, proper range use is an important concern of management. Maintaining the organic-matter content and an adequate level of fertility are also important concerns.

Nearly all of the acreage of this complex is in native range. Some of the larger areas are irrigated by center pivot systems. Small areas are in grass pasture and a small acreage is cultivated. Alfalfa and corn are the principal crops. Capability units IVe–5 dryland and IVe–11 irrigated; Sandy range site; windbreak suitability group 3.

Elsmere Series

The Elsmere series consists of deep, somewhat poorly drained, nearly level to gently sloping soils that formed in material deposited by wind and water. These soils occur mainly on bottom lands along the Platte River and a few other major streams. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet during dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet.

In a representative profile the surface layer is loose, dark grayish-brown loamy fine sand about 14 inches thick. Beneath this is an 8-inch transition layer of loose, grayish-brown fine sand. The underlying material is light brownish-gray and light-gray fine sand to a depth of 60 inches.

Elsmere soils have rapid permeability and low available water capacity. These soils have low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are marginally suited to cultivated crops under dryland or irrigated management. They are suited to grass, trees, and shrubs. Elsmere soils provide habitat for wildlife and areas for recreation.

Representative profile of Elsmere loamy fine sand, 0 to 3 percent slopes, in pasture, 3,590 feet south and 150 feet east of the northwest corner of sec. 36, T. 15 N., R. 31 W.:

A—0 to 14 inches, dark grayish-brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, subangular blocky structure; soft, loose; moderately alkaline; clear, smooth boundary.

AC—14 to 22 inches, grayish-brown (10YR 5/2) fine sand, dark grayish brown (10YR 4/2) moist; few, fine, distinct mottles, dark yellowish brown (10YR 4/4) moist; weak, medium and coarse, subangular blocky structure; soft, loose; strong effervescence; moderately alkaline; clear, smooth boundary.

C1—22 to 29 inches, light brownish-gray (10YR 6/2) fine sand, grayish brown (10YR 5/2) moist; few, fine, distinct mottles, yellowish brown (10YR 5/6) moist; weak, medium and coarse, subangular blocky structure; soft, loose; strong effervescence; moderately alkaline; clear, smooth boundary.

C2—29 to 43 inches, light-gray (10YR 7/2) fine sand, pale brown (10YR 6/3) moist; few, fine, distinct mottles, yellowish brown (10YR 5/6) moist; single grained; soft, loose; slight effervescence; moderately alkaline; gradual, smooth boundary.

C3—43 to 60 inches, light-gray (10YR 7/2) fine sand, pale brown (10YR 6/3) moist; few, fine, distinct mottles, yellowish brown (10YR 5/6) moist; single grained; soft, loose; moderately alkaline.

The A horizon is typically loamy fine sand but in places is loamy sand or fine sandy loam. It is dark grayish brown, dark gray, or grayish brown. The AC horizon is grayish-brown or light brownish-gray fine sand or loamy fine sand. Its thickness ranges from 6 to 10 inches. In places the C horizon is stratified with layers of fine sand, loamy fine sand, sandy loam, or loam. Dark-colored buried soils are in some areas.

Elsmere soils are associated with Valentine and Dunday soils in the sandy uplands and with Wann and Wet alluvial land on bottom land in the Platte Valley. They have a thicker A horizon than Valentine soils. The water table ranges from depths of 2 to 5 feet in Elsmere soils but is at a depth of more than 10 feet in Valentine and Dunday soils. Elsmere soils have a coarser textured C horizon than Wann and drained Lawet soils. They have a lower water table and are better drained than Lawet soils or Wet alluvial land.

Elsmere loamy fine sand, 0 to 3 percent slopes (EaB).—This soil is on bottom lands in the Platte Valley, on foot slopes that are transitional between sandhills and bottom lands, and along major drainageways in the sandy uplands. It occurs in areas ranging from 10 to 300 acres in size. The profile of this soil is the one described as representative of the Elsmere series, except that the soil on bottom lands in the Platte Valley has more coarse sand and pebbles throughout the profile than that in the sandhills drainageways.

Included with this soil in mapping were areas of Dunday and Valentine soils at higher elevations and some areas of Wann and Lawet soils at lower elevations. Also included were small areas of Elsmere soils that are saline and alkaline. These are shown on the detailed soil map by spot symbols.

Runoff is slow. In spring, when the water table rises to a depth of about 2 feet, wetness delays planting and in some places limits the use of the soil. Rainfall commonly is inadequate for shallow rooted crops. Soil blowing is a hazard. Maintaining fertility, organic-matter content, and adequate cover are concerns of management. Phosphorus commonly is needed for alfalfa.

A large part of the acreage of this soil is in native range. The remainder is cultivated. Alfalfa, corn, and grain sorghum are the principal crops. A few acres of alfalfa are irrigated. Capability units IVw–5 dryland and IVw–11 irrigated; Subirrigated range site; windbreak suitability group 2.

Elsmere complex, 0 to 5 percent slopes (ExC).—Soils of this complex are in low hummocky areas adjacent to the sandhills on the north side of the Platte Valley. These areas range from 20 to 300 acres in size. Elsmere soils at intermediate elevations in the mapping unit make up about 60 percent of the complex; Lawet soils, which occupy the lowest areas, make up 15 percent; and Dunday soils at the highest elevations, make up 25 percent.

Included with these soils in mapping were small areas of

Valentine soils at higher elevations. Also included were small wet depressions and intermittent ponds, 1 to 6 acres in size, at lower elevations.

Runoff is slow. Wetness at the lower elevations and the loose, sandy surface layer at the higher elevations make these soils difficult to work. Where the vegetative cover is not adequate, soil blowing is a severe hazard. The low available water capacity is a concern where soils of the Elsmere complex are irrigated. Plant nutrients can be easily leached beneath the reach of plant roots in these coarse-textured soils. Maintaining the fertility and organic-matter content are concerns of management, particularly where these soils are irrigated.

Most of the acreage of this complex is in native range. Some areas are cultivated and most of these are irrigated. Alfalfa is the principal crop. Capability units IVw–5 dryland and IVw–11 irrigated; Subirrigated range site; windbreak suitability group 2.

Fillmore Series

The Fillmore series consists of deep, poorly drained, nearly level soils in shallow basinlike depressions on uplands. These soils formed in loess or loamy colluvial-alluvial material and have a claypan subsoil.

In a representative profile the surface layer is friable silt loam that is dark grayish brown in the upper 4 inches and is light brownish gray and leached in the lower 5 inches. The subsoil is a 26-inch layer of firm to very firm, gray silty clay. Beneath this the underlying material is grayish-brown loam to a depth of 49 inches and pale-brown silt loam to a depth of 60 inches.

Fillmore soils have very slow permeability and high available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture slowly and release it slowly to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Fillmore soils provide habitat for wildlife and areas for recreation.

Representative profile of Fillmore silt loam in an area of Fillmore complex in a cultivated field, 1,214 feet east and 270 feet north of the southwest corner of sec. 4, T. 12 N., R. 34 W.:

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; slightly hard, friable; slightly acid; abrupt, smooth boundary.

A2—4 to 9 inches, light brownish-gray (10YR 6/2) silt loam, very dark gray (10YR 3/1) moist; weak, medium and fine, platy structure; slightly hard, friable; neutral; abrupt, smooth boundary.

B21t—9 to 15 inches, gray (10YR 5/1) silty clay, very dark brown (10YR 2/2) moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, firm; few, small, concretions (iron or manganese); few silt and sand grains on faces of peds; neutral; clear, smooth boundary.

B22t—15 to 35 inches, gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; weak, very coarse, prismatic structure parting to weak, medium, subangular blocky; very hard, very firm; few, small, concretions (iron or manganese); mildly alkaline; clear, smooth boundary.

C1—35 to 49 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; mildly alkaline; clear, smooth boundary.

C2—49 to 60 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; mildly alkaline.

The Ap and A1 horizons have a combined thickness of 4 to 11 inches and are grayish brown to dark grayish brown. The A2 horizon is 1 to 5 inches thick and is light brownish gray to gray. The B horizon, 12 to 30 inches thick, is grayish-brown to gray silty clay or heavy silty clay loam. The C horizon is mainly loam, silt loam, or silty clay loam.

Fillmore soils are associated in the landscape with Scott, Holdrege, Hord, and Hall soils. They occur in shallower depressions, have a thicker A horizon, and are ponded for longer periods than Scott soils. Fillmore soils have an A2 horizon that is lacking in Holdrege, Hord, and Hall soils and are more clayey in the B horizon than those soils.

Fillmore complex (0 to 1 percent slopes) (Fm).—Soils in this complex are in shallow basins or depressions that range from 5 to 35 acres in size. About 65 percent of the complex is Fillmore silt loam and about 35 percent is a soil having a surface layer of silty clay loam. In places the lower part of the surface layer is fine sandy loam. The underlying material is fine sandy loam in a few areas adjacent to the sandhills.

Included with this complex in mapping were small areas of Scott silt loam at lower elevations and small areas of Hord silt loam at higher elevations.

Ponding limits the use of these soils. Heavy rains in spring cause surface flooding. Moisture penetrates the claypan subsoil slowly and is released slowly to plants. Excessive wetness in spring delays tillage and planting. Where the surface is silty clay loam, the soil is somewhat plastic and difficult to work. When rainfall is low in summer and fall, these soils can be droughty if dryfarmed. Numerous small, timely showers are needed to provide an adequate moisture supply for dryland crops. Where the soils are irrigated, surface areas should be graded and leveled. Good water management is needed.

Most of the acreage of this soil is cultivated and some is irrigated. Corn and wheat are the principal crops. Capability units IIIw–2 dryland and IIIw–2 irrigated; Clayey Overflow range site; windbreak suitability group 6.

Gravelly Alluvial Land

Gravelly alluvial land (0 to 3 percent slopes) (Ga) is a land type that occupies islands in the broad braided Platte River and is adjacent to river channels. Areas of this land type range from 30 to 800 acres in size. About 60 percent of this somewhat poorly drained to poorly drained land type is stratified soil material that ranges from clay to sand in texture and is 1 to 9 inches deep over mixed sand and gravel. About 20 percent consists of silty and sandy soil materials that are 10 to 20 inches deep over mixed sand and gravel. The remaining 20 percent is made up of Riverwash, Marsh, and deep, very sandy soils. In most areas of Gravelly alluvial land the water table is at or near the surface.

The soil material in Gravelly alluvial land has rapid permeability, low available water capacity, low organic-matter content, and low natural fertility. Frequent flooding, the high water table, and the very shallow to shallow depths to sand and gravel are the principal limitations in using this land type. Root penetration and root development are limited.

Most of the acreage of this land type is used for grazing. The cover commonly consists of switchgrass, indiangrass, big bluestem, tall dropseed, and prairie dropseed. Fairly dense stands of eastern cottonwood, willows, and brush decrease the grazing potential in some places. Areas of Gravelly alluvial land that are close to farmsteads are commonly used for calving and feeding operations during

winter months. This land type provides excellent habitat for deer, quail, waterfowl, and other wildlife. It is not suited to the common cultivated crops. Capability unit VIIs-3 dryland; Subirrigated range site; windbreak suitability group 10.

Hall Series

The Hall series consists of deep, well-drained, nearly level to very gently sloping soils on tablelands and ridges of the uplands and on stream terraces in the Platte Valley. The upland soils formed in loess and the terrace soils formed in old alluvium.

In a representative profile the surface layer is very friable, gray to grayish-brown silt loam about 17 inches thick. The subsoil, 25 inches thick, is very friable, gray silt loam in the upper part; friable, light brownish-gray light silty clay loam in the middle part; and very friable, light brownish-gray silt loam in the lower part. Beneath the subsoil is an old buried surface layer consisting of grayish-brown silt loam 12 inches thick. The underlying material is pale-brown silt loam to a depth of 60 inches.

Hall soils have moderately slow permeability and high available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Hall soils provide habitat for wildlife and areas for recreation.

Representative profile of Hall silt loam, 0 to 1 percent slopes, in a cultivated field, 1,320 feet north and 100 feet east of the southwest corner of sec. 25, T. 9 N., R. 29 W.:

Ap—0 to 5 inches, gray (10YR 5/1) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; slightly hard, very friable; neutral; abrupt, smooth boundary.

A12—5 to 13 inches, gray (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, subangular blocky structure; slightly hard, very friable; neutral; clear, smooth boundary.

A13—13 to 17 inches, grayish-brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; weak, coarse, prismatic structure parting to a weak, fine and medium, subangular blocky; slightly hard, very friable; mildly alkaline; clear, smooth boundary.

B21—17 to 22 inches, gray (10YR 5/1) silt loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, prismatic structure parting to a weak, fine and medium, subangular blocky; slightly hard, very friable; mildly alkaline; clear, smooth boundary.

B22t—22 to 32 inches, light brownish-gray (10YR 6/2) light silty clay loam, dark grayish brown (10YR 4/2) moist; weak, coarse, prismatic structure parting to moderate, fine and medium, subangular blocky; hard, friable; mildly alkaline; clear, smooth boundary.

B23—32 to 42 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, coarse, prismatic structure parting to weak, fine and medium, subangular blocky; slightly hard, very friable; mildly alkaline; abrupt, smooth boundary.

Alb—42 to 54 inches, grayish-brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; weak, coarse, prismatic structure parting to weak, fine and medium, subangular blocky; slightly hard, very friable; strong effervescence; moderately alkaline; abrupt, smooth boundary.

C—54 to 60 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; violent effervescence; moderately alkaline.

The A horizon is 10 to 20 inches thick. The A and B horizons are gray to grayish brown to a depth of 20 to 30 inches. Depth to lime ranges from 28 to 48 inches. Dark-colored buried A horizons are common between depths of 20 and 48 inches.

Hall soils are associated with Hobbs, Fillmore, Holdrege, and Hord soils in the uplands and with Cozad soils on stream terraces. They have a B horizon that is not present in Hobbs soils and lack an A2 horizon that is present in Fillmore soils. Hall soils have more clay in the B horizon than Holdrege, Hord, or Cozad soils and less than Fillmore soils. They are dark colored to a greater depth than Cozad soils.

Hall silt loam, 0 to 1 percent slopes (HaA).—This silty soil is on tablelands and ridges of the loess uplands in areas ranging from 10 to 250 acres in size. The profile of this soil is the one described as representative of the Hall series. In small areas the dark color extends to a lesser depth and in places the subsoil is not so clayey.

Included with this soil in mapping were small areas of Fillmore soils in shallow depressions. These depressions are designated on the soil map by special spot symbols.

Runoff is slow. This is one of the best soils in Lincoln County for growing crops. Where it is dryfarmed, insufficient moisture is the principal limitation and soil blowing is a hazard.

Most of the acreage of this soil is cultivated and about half is irrigated. Corn, grain sorghum, wheat, and alfalfa are the principal crops. Capability units IIc-1 dryland and I-4 irrigated; Silty Lowland range site; windbreak suitability group 4.

Hall silt loam, 1 to 3 percent slopes (HaB).—This soil is on tablelands and broad ridges of the uplands in areas ranging from 10 to 300 acres in size. The profile of this soil is similar to the one described as representative of the Hall series, except that the surface layer and subsoil are slightly thinner. In places the dark color extends to a depth of less than 20 inches and in small areas the subsoil is not so clayey.

Included with this soil in mapping were small depressional areas of Fillmore silt loam. These areas are designated on the soil map by special spot symbols.

Runoff is slow to medium. Erosion by water and soil blowing are moderate hazards. Inadequate moisture usually limits crop production where this soil is dryfarmed. In places land grading is needed for gravity irrigation.

Most of the acreage of this soil is cultivated and a small part of this is irrigated. Corn, grain sorghum, wheat, and alfalfa are the principal crops. Capability units IIe-1 dryland and IIe-4 irrigated; Silty range site; windbreak suitability group 4.

Hall silt loam, terrace (0 to 1 percent slopes) (Hb).—This soil is on stream terraces south of the Platte River in areas ranging from 5 to 200 acres in size. The profile of this soil is similar to the one described as representative of the Hall series, except that the subsoil is slightly thicker and lime carbonate is nearer the surface. In a few small areas the subsoil is silt loam or silty clay. Depth to the water table ranges from 10 to about 20 feet.

Runoff is slow. This is one of the best soils in Lincoln County for crop production. Where it is dryfarmed, lack of sufficient moisture is the principal limitation and soil blowing is a hazard.

All of the acreage of this soil is cultivated and most is irrigated. Corn, alfalfa, and grain sorghum are the principal crops. Capability units IIc-1 dryland and I-4 irrigated; Silty Lowland range site; windbreak suitability group 4.

Hersh Series

The Hersh series consists of deep, well-drained, nearly level to steep soils on uplands and old stream terraces.

These soils formed in wind-deposited or wind-reworked sandy and loamy material.

In a representative profile the surface layer is very friable, grayish-brown fine sandy loam about 7 inches thick. Beneath this is a 4-inch transition layer of very friable, grayish-brown fine sandy loam. The underlying material is pale-brown fine sandy loam to a depth of 60 inches.

Hersh soils have moderately rapid permeability and high available water capacity. These soils have very low organic-matter content and low natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to grass, trees, and shrubs. Where the gradient is less than 9 percent, they are suited to cultivated crops under dryland or irrigated management. Hersh soils provide habitat for wildlife and areas for recreation.

Representative profile of Hersh fine sandy loam in an area of Hersh soils, 3 to 5 percent slopes, in a cultivated field, 2,376 feet west and 330 feet south of the northeast corner of sec. 16, T. 12 N., R. 30 W.:

Ap—0 to 4 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, fine, granular structure; soft, very friable; neutral; abrupt, smooth boundary.

A12—4 to 7 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable; neutral; clear, smooth boundary.

AC—7 to 11 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; soft, very friable; mildly alkaline; clear, smooth boundary.

C1—11 to 48 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak, medium and coarse, subangular blocky structure; soft, very friable; mildly alkaline; clear, smooth boundary.

C2—48 to 60 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; mildly alkaline.

The A horizon is typically fine sandy loam or loamy fine sand but in places is loam or silt loam. It is 6 to 10 inches thick. The AC horizon is 4 to 6 inches thick and is light brownish gray to grayish brown. The C horizon is fine sandy loam or loamy fine sand.

Hersh soils are associated in the landscape with Dunday, Anselmo, Valentine, Hord, and Holdrege soils. They have a thinner A horizon than Dunday soils and a lighter colored A horizon than Anselmo soils. Hersh soils do not contain as much sand as Valentine soils. They contain more sand and are lighter colored than Hord and Holdrege soils. Hersh soils lack the B horizon that is present in Holdrege and Hord soils.

Hersh-Anselmo fine sandy loams, 1 to 3 percent slopes (HcB).—This soil complex is mainly in sand-loess transition areas on the uplands. It occupies a few areas in Wildhorse Creek valley and on stream terraces in the South Platte River valley. Areas of this complex range from 15 to 150 acres in size. Hersh fine sandy loam, on convex areas and side slopes, makes up about 70 percent of the complex, and Anselmo fine sandy loam, in concave positions, makes up about 20 percent. The remaining 10 percent consists of included soils.

The profile of each major soil in this complex is similar to the one described as representative of its respective series, except that the surface layer is slightly lighter colored. Soil blowing has removed much of the original surface layer of the Hersh soils and has deposited it as a thin overburden on adjacent Anselmo soils at lower elevations.

Included with these soils in mapping were areas of Hord fine sandy loam and Valentine loamy fine sand. Also included on stream terraces in the Platte Valley were a few areas of light-colored soils that are calcareous near the surface. These formed in calcareous sandy material weathered from exposures of the sandstone bedrock.

Runoff is slow. Soil blowing is a severe hazard where these soils are dryfarmed. These soils are easily worked, but they lack their original fertility and the organic-matter content is very low in most areas.

Most of the acreage of this complex is cultivated. Wheat, alfalfa, and corn are the principal crops. Some of the corn and alfalfa are irrigated. A few areas have been reseeded to native grass and are used for grazing. Capability units IIIe–3 dryland and IIIe–8 irrigated; Sandy range site; windbreak suitability group 3.

Hersh-Valentine loamy fine sands, 0 to 5 percent slopes (HdC).—This complex is in sand-loess transition areas on the uplands and in valleys of the sandhills. Areas of the complex range from 25 to 300 acres in size. Hersh loamy fine sand, in the concave parts of the landscape, makes up about 45 percent of the complex and Valentine loamy fine sand, on the hummocky parts, makes up about 30 percent. The remaining 25 percent is included soils.

The profile of each major soil is similar to the one described as representative of its respective series, except that the surface layer is loamy fine sand. Small areas of dark soils have a coarse-textured surface layer and a medium-textured subsoil. Sandy soils having siltstone and sandstone below a depth of about 30 inches occur in some places.

Included with these soils in mapping were areas of Anselmo, Dunday, Vetal, and Hord soils, mainly at lower elevations than the major soils.

Runoff is slow. Soil blowing is a severe hazard where these soils are cultivated. Organic-matter content is low.

Soils in this complex have been farmed with other soils in the past but most of the acreage has been reseeded to native grass and is used for grazing. Only a few areas are cultivated. Wheat, corn, and rye are the principal crops. Capability units IVe–5 dryland and IVe–10 irrigated; Sandy range site; windbreak suitability group 3.

Hersh soils, 3 to 5 percent slopes (HeC).—This mapping unit is in sand-loess transition areas on the uplands and in a few areas of the sandhills. Areas of these soils range from 15 to 500 acres in size. The surface layer is fine sandy loam, loam, and loamy fine sand. In places it is thick and dark colored. The subsoil is silt loam in some areas.

Runoff is slow. Soil blowing is a severe hazard where this soil is cultivated. Small blowouts occur in some areas. Maintaining the fertility and improving the organic-matter content are important concerns of management.

Most of the acreage of these soils is cultivated. Wheat and grain sorghum are the principal crops. Some corn also is grown. A few areas have been reseeded to native grass. Capability units IIIe–3 dryland and IIIe–8 irrigated; Sandy range site; windbreak suitability group 3.

Hersh soils, 5 to 9 percent slopes (HeD).—This mapping unit is in sand-loess transition areas on the uplands. Areas of these soils range from 10 to 500 acres in size. The profile of these soils is similar to the one described as representative of the Hersh series, except that the surface layer is loam, fine sandy loam, or loamy fine sand and, in places, is thick and dark colored.

Included with these soils in mapping were small areas of Uly silt loam at lower elevations and a few areas that have a heavy loam subsoil and a loam underlying material.

Runoff is medium. Lack of sufficient moisture is a common limitation. These soils are droughty and soil blowing is a severe hazard where the surface is not protected. Maintain-

ing fertility and improving the organic-matter content are important concerns of management.

Nearly all of the acreage of these soils is cultivated. A few areas are irrigated by sprinkler systems. Wheat and other small grains are the principal crops. A small acreage of corn is produced. Capability units IVe–3 dryland and IVe–8 irrigated; Sandy range site; windbreak suitability group 3.

Hersh and Anselmo soils, 9 to 30 percent slopes (HfF).—This undifferentiated group of soils is on breaks that slope to drainageways in sand-loess transition areas in the uplands. It occurs in areas that range from 20 to 500 acres in size. Hersh soils, 9 to 30 percent slopes, occupy the steepest part of the landscape. Anselmo soils, 9 to 15 percent slopes, occupy concave areas. These soils occur in widely ranging proportions. In places the areas of the two soils in the group are about equal, but in others the total area consists of as much as 80 percent of one soil and as little as 20 percent of the other. Generally the Hersh soils are predominant.

The profile of each of these soils is similar to the one described as representative of its respective series, except that the surface layer is loam, silt loam, loamy fine sand, or fine sandy loam.

Included with these soils in mapping were small areas of Valentine loamy fine sand and Dunday loamy fine sand at higher elevations and small areas of Coly silt loam at lower elevations. Slopes in some areas are rough, broken, and very steep.

Runoff is medium. Erosion by water and soil blowing are very severe hazards. These soils generally are eroded, but most of the drainageways are well defined and stabilized.

Nearly all of the acreage of these soils is in native range. A few small areas adjacent to loamy soils are cultivated. Wheat is the principal crop. Capability unit VIe–3 dryland; Sandy range site; windbreak suitability group 3.

Hersh and Valentine soils, 5 to 9 percent slopes (HgD).—This undifferentiated group consists of severely eroded soils in sand-loess transition areas on the uplands. Areas of this group range from 10 to 50 acres in size. The Hersh soils are less severely eroded than the Valentine soils and are predominant in most areas. Soils in this group occur in widely ranging proportions, from as little as 10 percent of one to as much as 90 percent of the other.

The profile of each of these soils is similar to the one described as representative of its respective series, except that the surface layer is thinner and lighter colored and is fine sandy loam, loamy fine sand, or fine sand.

Included with these soils in mapping were many small blowouts. Where these blowouts are of sufficient size, these are shown on the soil map by a special spot symbol.

Runoff is very slow. These soils are droughty, particularly where erosion has been most severe. Soil blowing is a very severe hazard. Increasing the fertility and improving the organic-matter content are important concerns of management.

Most of the acreage of this mapping unit has been seeded to native grass or has been left idle. A few areas are in wheat but stands generally are poor. Capability unit VIe–5 dryland; Sandy range site; windbreak suitability group 7.

Hobbs Series

The Hobbs series consists of deep, well-drained and moderately well drained, nearly level to gently sloping soils. These soils formed in alluvial and colluvial materials on foot slopes of the loess uplands and on bottom lands in intermittent, narrow drainageways of the uplands.

In a representative profile the surface layer is friable, dark grayish brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches is 12 inches of dark grayish brown and grayish brown silt loam, 17 inches of dark gray silt loam, 17 inches of dark grayish brown very fine sandy loam, and 8 inches of light gray very fine sandy loam.

Hobbs soils have moderate permeability and high available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops. They are also suited to grass, trees, and shrubs. Hobbs soils provide habitat for wildlife and areas for recreation.

Representative profile of Hobbs silt loam, 3 to 7 percent slopes, in a cultivated field, 2,376 feet east and 2,376 feet north of the southwest corner of sec. 2, T. 13 N., R. 26 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, friable; neutral; abrupt, smooth boundary.

C1—6 to 18 inches, dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) and dark grayish-brown (10YR 4/2) moist; weak, medium and coarse, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; neutral; abrupt, smooth boundary.

C2—18 to 35 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist; weak, coarse, subangular blocky structure; slightly hard, very friable; mildly alkaline; clear, smooth boundary.

C3—35 to 39 inches, dark grayish-brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, subangular blocky structure; soft, very friable; mildly alkaline; clear, smooth boundary.

C4—39 to 52 inches, grayish-brown (10YR 5/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, medium and coarse, subangular blocky structure; soft, very friable; thin, silt loam layers; mildly alkaline; clear, smooth boundary.

C5—52 to 60 inches, light-gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak, medium and coarse, subangular blocky structure; soft, very friable; thin, silt loam layers; moderately alkaline.

The A horizon is silt loam or fine sandy loam and is 30 to 48 inches thick. Lime is leached below a depth of 40 inches on the nearly level and very gentle slopes and below a depth of 36 inches on gentle slopes.

Hobbs soils are associated in the landscape with Holdrege, Hersh, Hord, Coly, Uly, and McCook soils. They have a thicker A horizon than any of these associated soils and lack the B horizon that is present in Holdrege soils. Hobbs soils have less clay between depths of 10 and 40 inches than Holdrege soils and less sand between depths of 10 and 40 inches than Hersh soils.

Hobbs fine sandy loam, 0 to 3 percent slopes (HhB).—This well-drained soil is on concave foot slopes and alluvial fans of upland drainageways and in swales and valleys in sand-loess transition areas on the uplands. It occurs in areas that range from 10 to 200 acres in size. The profile of this soil is similar to the one described as representative of the Hobbs series, except that the upper part of the surface layer is fine sandy loam about 10 inches thick. Some areas have a fine sandy loam subsoil, and small areas have a silty subsoil that is not stratified.

Included with this soil in mapping were areas of soils similar to Vetal soils, except that the surface layer is loamy fine sand.

Runoff is slow. Soil blowing is the principal hazard.

Nearly all of the acreage of this soil is cultivated and part of this is irrigated. Wheat, corn, and alfalfa are the principal crops. Capability units IIe–3 dryland and IIe–5 irrigated; Sandy range site; windbreak suitability group 3.

Hobbs fine sandy loam, 3 to 7 percent slopes (HhC).—This well-drained soil is on concave foot slopes and bottom lands of drainageways in sand-loess transition areas of the uplands. It occurs in areas that range from 10 to 100 acres in size. The profile of this soil is similar to the one described as representative of the Hobbs series, except that the upper 6 to 10 inches of the surface layer is fine sandy loam. Some areas have a fine sandy loam subsoil, and a few small areas have a clayey subsoil that is not stratified.

Runoff is slow. Erosion by water and soil blowing are severe hazards. Gullies form in places where the soil is not terraced.

Nearly all of the acreage of this soil is cultivated and part of this is irrigated. Wheat, corn, and alfalfa are the principal crops. Capability units IIIe–3 dryland and IIIe–5 irrigated; Sandy range site; windbreak suitability group 3.

Hobbs silt loam, 0 to 1 percent slopes (HkA).—This well-drained silty soil is in upland valleys and basins. Areas of this soil range from 10 to 150 acres in size. The larger areas are in Wildhorse Creek valley and along upland drainageways. Smaller areas occur along Medicine Creek. The profile of this soil is similar to the one described as representative of the Hobbs series, except that a thin layer of calcareous silt loam is on the surface. In small areas the surface layer is less than 20 inches thick, and in some places the soil is not stratified.

Included with this soil in mapping were a few areas of Hobbs fine sandy loam at slightly higher elevations.

Runoff is slow. This is one of the best soils in Lincoln County for growing cultivated crops. Where this soil is dryfarmed, lack of sufficient moisture is the principal limitation and soil blowing is a hazard. Most of the larger acreages of this soil are cultivated and much of this is irrigated. The smaller areas are in native grass. Corn, alfalfa, grain sorghum, and wheat are the principal crops. Capability units IIc–1 dryland and I–6 irrigated; Silty Lowland range site; windbreak suitability group 1.

Hobbs silt loam, 1 to 3 percent slopes (HkB).—This well-drained soil is on concave foot slopes and in narrow alluvial drainageways of the loess uplands. It occurs in areas that range from 5 to 150 acres in size. The profile of this soil is similar to the one described as representative of the Hobbs series, except that the surface layer is less than 20 inches thick in places and the soil is not stratified in some areas.

Runoff is slow. Where this soil is dryfarmed, an inadequate supply of moisture commonly is a limitation. Erosion by water and soil blowing are hazards. After rains, water flowing from adjacent soils at higher elevations causes gully erosion in places.

Most of the acreage of this soil is cultivated and part of this is irrigated. Corn, grain sorghum, and alfalfa are the principal crops. Where associated with steeply sloping soils, this Hobbs silt loam is in native range. Capability units IIe–1 dryland and IIe–6 irrigated; Silty Lowland range site; windbreak suitability group 1.

Hobbs silt loam, 3 to 7 percent slopes (HkC).—This well-drained soil is on the lower foot slopes in drainageways of the uplands. It occurs in irregularly shaped areas that range from 10 to 40 acres in size. The profile of this soil is the one described as representative of the Hobbs series.

Included with this soil in mapping were small areas of the nearly level Hobbs silt loam at lower elevations and small areas of Hobbs fine sandy loam at higher elevations.

Runoff is slow to medium. Where this soil is cultivated, erosion by water and soil blowing are moderate hazards. In places small gullies form on long gentle slopes.

Most of the acreage of this soil is cultivated. A few areas are in native grass. Corn, grain sorghum, and alfalfa are the principal crops. Capability units IIIe–1 dryland and IIIe–6 irrigated; Silty range site; windbreak suitability group 4.

Hobbs and McCook silt loams (0 to 3 percent slopes) (Hm).—Soils in this moderately well drained undifferentiated unit are on narrow flood plains of drainageways in the loess hills and in canyons of the uplands. They generally occur in long, narrow areas ranging from 5 to 200 acres in size. Occasional flooding after heavy rains leaves deposits of soil material on the surface of these soils.

The profile of each of the major soils in this unit is similar to the one described as representative of its respective series, except that the Hobbs soil has a thin layer of light-colored, calcareous soil material deposited on the original surface layer. Both Hobbs and McCook soils occur in most areas of this mapping unit, but only one of these soils is present in a few places. Most areas that consist of only McCook soils are on narrow flood plains of streams that drain into Frontier County. Mapped areas in the western part of the county have a higher percentage of McCook soils than Hobbs soils. The Hobbs soils are at the highest elevations.

Included with these soils in mapping were small areas of gently sloping Hobbs soils.

Runoff is slow. Occasional flooding is the principal hazard. Wetness delays tillage in some years, but floodwater can be beneficial to crops and grass if it does not come in torrents, does not become too deep, and does not remain too long. Slight scouring or gully formation can occur during heavy rains.

In the broadest areas of this undifferentiated unit most of the acreage is cultivated and some is irrigated. Alfalfa, corn, and wheat are the principal crops. Most of the narrow areas are in native grass, which generally is mown for hay. Capability units IIw–3 dryland and IIw–6 irrigated; Silty Overflow range site; windbreak suitability group 1.

Holdrege Series

The Holdrege series consists of deep, well-drained, nearly level to moderately sloping soils formed in loess on uplands (fig. 11).

In a representative profile the surface layer is very friable to friable, dark grayish-brown silt loam about 10 inches thick. Beneath this is about 13 inches of subsoil that is friable, grayish-brown silt loam in the upper part and friable, brown light silty clay loam in the lower part. The underlying material is pale-brown silt loam to a depth of 60 inches.

Holdrege soils have moderate permeability and high available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under both dryland or irrigation management. They also are suited to grass, trees, and shrubs. Holdrege soils provide habitat for wildlife and areas for recreation.

Figure 11.—**Profile of Holdrege silt loam, a deep, well-drained silty soil that formed in loess.**

Representative profile of Holdrege silt loam, 1 to 3 percent slopes, in a cultivated field, 792 feet north and 100 feet west of the southeast corner of sec. 35, T. 10 N., R. 29 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak, coarse, subangular blocky structure parting to weak, medium and fine, granular; slightly hard, very friable; neutral; abrupt, smooth boundary.

A12—6 to 10 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak, medium and coarse, prismatic structure parting to weak, medium, granular; hard, friable; mildly alkaline; clear, smooth boundary.

B21—10 to 16 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky; very hard, friable; mildly alkaline; clear, smooth boundary.

B22t—16 to 23 inches, brown (10YR 5/3) light silty clay loam, dark grayish brown (10YR 4/2) moist; weak, medium, prismatic structure parting to moderate, medium and fine, subangular blocky; very hard, friable; moderately alkaline; clear, smooth boundary.

C1—23 to 33 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak, medium, prismatic structure parting to weak, medium and fine, subangular blocky; hard, very friable; moderately alkaline; abrupt, smooth boundary.

C2—33 to 60 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak, medium, prismatic structure; soft, very friable; violent effervescence; moderately alkaline.

The A horizon is typically fine sandy loam or silt loam but in places is silty clay loam. It is 8 to 14 inches thick. The B21 horizon is grayish-brown to dark grayish-brown silt loam or light silty clay loam and is 4 to 6 inches thick. Depth to lime carbonate ranges from 24 to 50 inches on very gentle slopes and from 16 to 24 inches on moderately steep slopes.

Holdrege soils are associated in the landscape with Hord, Uly, Anselmo, Coly, Hobbs, and Hersh soils. They have more clay in the B horizon than Hord or Uly soils and less sand in the B horizon than Anselmo soils. Holdrege soils have a thinner solum than Hord soils and a thicker A horizon than Coly soils. The B horizon present in Holdrege soils is lacking in Coly, Hobbs, and Hersh soils.

Holdrege fine sandy loam, 0 to 3 percent slopes (HnB).—This loamy soil is in sand-loess transition areas of the uplands. It occurs in areas ranging from 5 to 150 acres in size. The profile of this soil is similar to the one described as representative of the Holdrege series, except the surface layer is fine sandy loam that generally is 6 to 10 inches thick but is more than 20 inches thick in places. The subsoil is silt loam.

Included with this soil in mapping were small areas of Holdrege silt loam.

Runoff is slow. Where this soil is dryfarmed, lack of sufficient moisture limits crop production in most years. If the surface is unprotected, soil blowing is a moderate hazard. Maintaining fertility and keeping crop residue on the surface are important concerns of management.

Nearly all of the acreage of this soil is cultivated. Most areas are dryfarmed, but a few are irrigated. Corn, alfalfa, and wheat are the principal crops. Capability units IIe-3 dryland and IIe-5 irrigated; Sandy range site; windbreak suitability group 3.

Holdrege silt loam, 1 to 3 percent slopes (HoB).—This soil is on narrow ridges of the loess uplands. It occurs in irregularly shaped areas ranging from 20 to 500 acres in size. The profile of this soil is the one described as representative of the Holdrege series. In places the surface layer is more than 20 inches thick and the subsoil is silt loam. An accumulation of lime commonly occurs directly beneath the subsoil.

Included with this soil in mapping were areas of Holdrege fine sandy loam at slightly higher elevations. Also included in the southwestern part of the county were silty soils that have a thinner surface layer and a thinner subsoil than those described in the profile.

Runoff is slow. Where this soil is dryfarmed, an inadequate supply of moisture limits crop production during most years. Erosion by water and soil blowing are the principal hazards. Some land grading is needed for gravity irrigation.

A large part of the acreage of this soil is cultivated. Most areas are dryfarmed but a few are irrigated. Corn, alfalfa, and wheat are the principal crops. A small acreage is in native grass. Capability units IIe-1 dryland and IIe-4 irrigated; Silty range site; windbreak suitability group 4.

Holdrege silt loam, 3 to 7 percent slopes (HoC).—This soil formed in loess on narrow, convex ridges of uplands. It occurs in long, narrow areas ranging from 10 to 30 acres in

size. The profile of this soil is similar to the one described as representative of the Holdrege series, except that the surface layer averages slightly thinner.

Included with this soil in mapping were small areas of eroded Holdrege silt loam and moderately sloping Holdrege silt loam. Also included were areas of gently sloping Hobbs silt loam at lower elevations.

Runoff is slow to medium. Where this soil is dryfarmed, an inadequate supply of moisture commonly limits crop production. Erosion by water is a hazard.

A large part of the acreage of this soil is in native grass, but a small part is cultivated. Corn, wheat, and alfalfa are the principal crops. Capability units IIIe–1 dryland and IIIe–4 irrigated; Silty range site; windbreak suitability group 4.

Holdrege silt loam, 3 to 7 percent slopes, eroded (HoC2).—This soil is mainly on convex ridges in the loess uplands but some is in sand-loess transition areas. It occurs in areas ranging from 10 to 160 acres in size. The profile of this soil is similar to the one described as representative of the Holdrege series, except that the surface layer is thinner and in the southwestern part of the county the subsoil also is thinner. In places the subsoil and underlying material are stratified.

Included with this soil in mapping were a few areas of moderately sloping Holdrege silt loam. Also included were a few areas that have a fine sandy loam surface layer and a loam or clay loam subsoil.

Runoff is medium. Erosion by water is the principal hazard, and gullies are common after heavy rains. This soil is easily worked, but soil blowing can occur where the surface is unprotected. Maintaining fertility and improving the organic-matter content are concerns of management, particularly on the light-colored, severely eroded areas.

Nearly all of the acreage of this soil is cultivated. Wheat, corn, and alfalfa are the principal crops. Capability units IIIe–1 dryland and IIIe–4 irrigated; Silty range site; windbreak suitability group 4.

Holdrege complex, 3 to 7 percent slopes (HpC).—Soils in this complex formed in mixed loess and eolian sand on convex ridges in sand-loess transition areas of the uplands. They occur in areas that generally are elongated in a northwest to southeast direction and range from 10 to 300 acres in size. About 60 percent of this complex is Holdrege fine sandy loam or Holdrege silt loam, about 25 percent is Anselmo fine sandy loam or Hersh fine sandy loam, and the remaining 15 percent is Hord fine sandy loam and Hobbs fine sandy loam. The soils having a fine sandy loam surface layer are at the highest elevations.

The profile of each soil in this complex is similar to the one described as representative of its respective series, except that the surface layer contains a higher proportion of sand in many places.

Included with these soils in mapping were small areas of moderately steep Holdrege and Hersh soils. Also included were small, severely eroded sandy areas at higher elevations. These are designated on the soil map by a special spot symbol.

Runoff is slow to medium. Soil blowing is a severe hazard. Maintaining or improving the organic-matter content and improving the fertility are important concerns of management. The sandy areas are very low in organic-matter content and low in fertility.

Most of the acreage of this complex is cultivated. Corn, wheat, and alfalfa are the principal crops. Capability units IIIe–3 dryland and IIIe–5 irrigated; Sandy range site; windbreak suitability group 3.

Holdrege and Uly silt loams, 7 to 9 percent slopes (HrD).—Soils in this mapping unit are on breaks of the loess upland and of the sand-loess transition areas. They occur in areas ranging from 10 to 70 acres in size. Although most areas of this mapping unit contain both soils, some consist almost entirely of Holdrege silt loam and others are composed mostly of Uly silt loam. However, Holdrege soils are predominant in most areas.

The profile of each of these soils is similar to the one described as representative of its respective series, except that the surface layer is thinner.

Included with these soils in mapping were small areas of Holdrege fine sandy loam and Hersh fine sandy loam, generally at higher elevations than the silt loam soils. Also included in the more eroded areas were small areas of Coly soils. The most severely eroded areas are shown on the soil map by a spot symbol.

Runoff is rapid from cultivated areas and is medium from areas of native grass. Erosion by water is a very severe hazard. Conserving moisture and preventing runoff are primary concerns of management.

Most of the acreage of this mapping unit is cultivated under dryland conditions. A few areas are in native grass. Corn, alfalfa, and wheat are the principal crops. Capability units IVe–1 dryland and IVe–4 irrigated; Silty range site; windbreak suitability group 4.

Hord Series

The Hord series consists of deep, well-drained, nearly level and very gently sloping soils in shallow basins and swales on silty uplands, in sand-loess transition areas of the uplands, and on stream terraces (fig. 12).

In a representative profile the surface layer is friable, very dark grayish-brown silt loam about 16 inches thick. The subsoil is friable, dark grayish-brown silt loam in the upper 18 inches, friable, grayish-brown light silty clay loam in the middle 15 inches, and friable, grayish-brown silt loam to a depth of 60 inches.

Hord soils have moderate permeability and high available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Hord soils provide habitat for wildlife and areas for recreation.

Representative profile of Hord silt loam, 0 to 1 percent slopes, in a cultivated field, 528 feet west and 100 feet north of the southeast corner of sec. 3, T. 16 N., R. 27 W.:

Ap—0 to 5 inches, very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure parting to weak, medium, granular; slightly hard, friable; neutral; clear, smooth boundary.

A12—5 to 16 inches, very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure; slightly hard, friable; neutral; clear, smooth boundary.

B21—16 to 34 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure; slightly hard, friable; mildly alkaline; clear, smooth boundary.

B22—34 to 49 inches, grayish-brown (10YR 5/2) light silty clay loam, dark grayish brown (10YR 4/2) moist; weak,

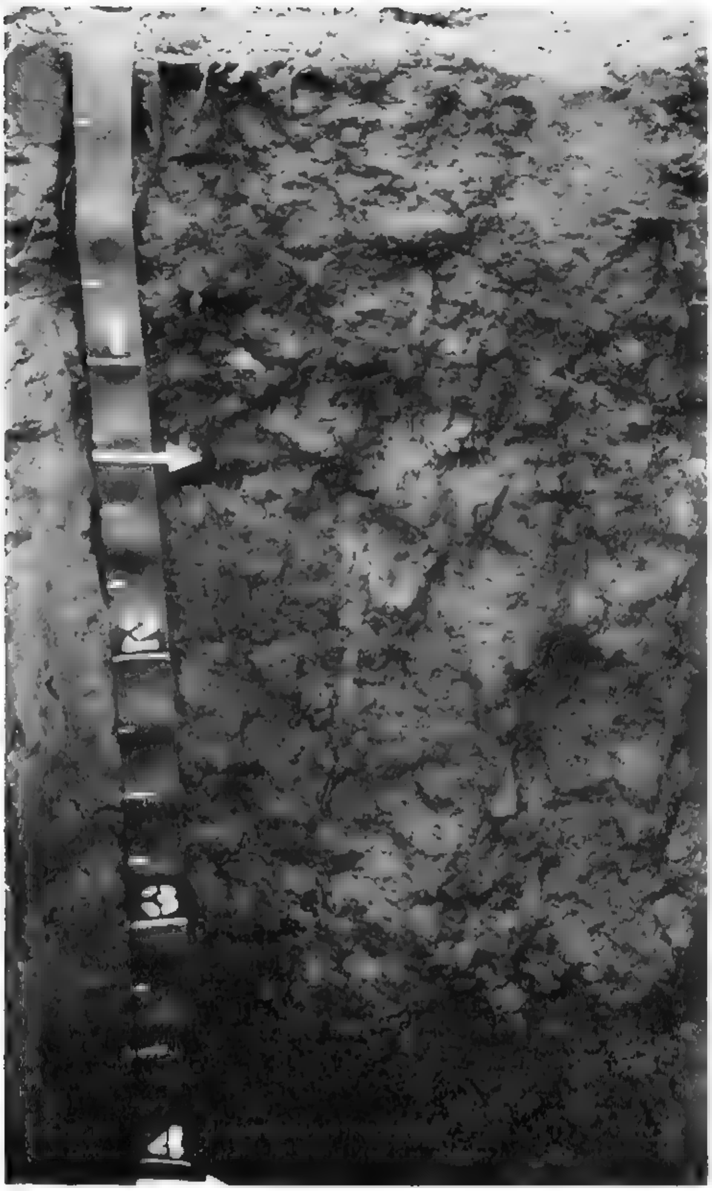

Figure 12.—**Profile of Hord silt loam, a deep, silty soil on uplands and stream terraces.**

medium, subangular blocky structure; slightly hard, friable; mildly alkaline; clear, smooth boundary.

B3—49 to 60 inches, grayish-brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; slightly hard, friable; mildly alkaline.

The A horizon is typically silt loam or fine sandy loam but in places is loam. It is 11 to 25 inches thick and is dark gray to very dark grayish brown. Buried soils are common in the lower part of the profile. Depth to lime ranges from 32 to more than 60 inches.

Hord soils are associated with Cozad soils on stream terraces and with Coly, Holdrege, Uly, and Hersh soils on uplands. They have a thicker A horizon than any of these associated soils and a less clayey B horizon than Holdrege soils. Hord soils are finer textured between depths of 10 and 40 inches than Hersh soils.

Hord fine sandy loam, 0 to 3 percent slopes (HsB).—This soil is in swales, valleys, and basins of sand-loess transition areas on the uplands. It occurs in areas ranging from 5 to 300 acres in size. The profile of this soil is similar to the one described as representative of the Hord series, except that the upper part of the surface layer is fine sandy loam. In places the surface layer is fine sandy loam throughout. In a few areas the subsoil is silty clay loam, and in places a dark, buried surface layer occurs between depths of 20 and 36 inches.

Included with this soil in mapping were small areas of the Fillmore complex.

Runoff is slow. This is one of the best soils in Lincoln County for growing cultivated crops. It responds well to irrigation management. Where this soil is dryfarmed, soil blowing is a moderate hazard. An adequate moisture supply for growing dryland crops generally is lacking during most years even though the soil receives additional moisture as runoff from adjacent soils at higher elevations. A few areas are ponded, but damage to crops is not appreciable.

Nearly all of the acreage of this soil is cultivated, and part of this is irrigated. Corn, wheat, and alfalfa are the principal crops. Smaller amounts of grain sorghum and forage sorghum are grown. Capability units IIe–3 dryland and IIe–5 irrigated; Sandy range site; windbreak suitability group 3.

Hord silt loam, 0 to 1 percent slopes (HtA).—This silty soil is in basins and swales of loess uplands and sand-loess transition areas on the uplands. It occurs in irregularly shaped areas ranging from 10 to 500 acres in size. The profile of this soil is the one described as representative of the Hord series. In places the subsoil is silty clay loam. A buried surface layer occurs between depths of 18 and 36 inches in some areas, and the underlying material is stratified in places.

Included with this soil in mapping were small areas of Fillmore and Scott soils in depressions.

Runoff is slow. This is one of the best soils in Lincoln County for growing crops. Where this soil is dryfarmed, lack of sufficient moisture is the principal limitation although the soil receives runoff water from adjacent soils at higher elevations. If the surface is not protected, soil blowing is a hazard.

Nearly all of the acreage of this soil is cultivated and a large part is irrigated. Corn, wheat, and grain sorghum are the principal crops. Capability units IIc–1 dryland and I–6 irrigated; Silty range site; windbreak suitability group 4.

Hord silt loam, 1 to 3 percent slopes (HtB).—This silty soil occupies concave shallow basins, swales, and areas along small drainageways in silty uplands and in sand-loess transition areas on the uplands. It occurs in areas ranging from 20 to 600 acres in size. The profile of this soil is similar to the one described as representative of the Hord series, except that small areas have 10 to 20 inches of recently deposited light-colored material on the surface. In places the subsoil is silty clay loam, and some areas have a buried surface layer between depths of 20 and 36 inches.

Included with this soil in mapping were small areas of Fillmore soils in depressions.

Runoff is slow. Where this soil is dryfarmed, lack of sufficient moisture limits crop production during most years. If the surface is unprotected, it is subject to soil blowing. Erosion by water is a moderate hazard. Some land grading is needed for gravity irrigation.

Most of the acreage of this soil is cultivated and some is irrigated. Wheat, grain sorghum, alfalfa, and corn are the principal crops. Capability units IIe–1 dryland and IIe–6 irrigated; Silty range site; windbreak suitability group 4.

Hord silt loam, terrace, 0 to 1 percent slopes (HxA).—This soil occurs on stream terraces in the Platte Valley in areas ranging from 10 to 160 acres in size. The profile of this soil is similar to the one described as representative of the Hord series, except that the subsoil is thinner and lime is nearer to the surface. In places the surface layer is less than 20 inches thick and lime is at a depth of 15 inches.

Runoff is slow. This is one of the best soils in Lincoln County for growing cultivated crops. Where this soil is dryfarmed, lack of sufficient moisture is the principal limitation. If the surface is not protected, soil blowing is a hazard.

Practically all of the acreage of this soil is cultivated and most of this is irrigated. Corn, alfalfa, and grain sorghum are the principal crops. Capability units IIc–1 dryland and I–6 irrigated; Silty Lowland range site; windbreak suitability group 4.

Hord silt loam, terrace, 1 to 3 percent slopes (HxB).—This soil occurs on stream terraces south of the Platte River in irregularly shaped areas ranging from 10 to 30 acres in size. The profile of this soil is similar to the one described as representative of the Hord series, except that the subsoil is thinner. In places the surface layer is loam, and in a few small areas the surface layer is only 10 to 20 inches thick. Depth to the water table ranges from 8 to 18 feet.

Runoff is slow. Where this soil is dryfarmed, an inadequate supply of moisture commonly limits crop production. If the surface is unprotected, soil blowing can occur. Erosion by water is a moderate hazard.

Most of the acreage of this soil is cultivated, and part of this is irrigated. Corn, grain sorghum, and alfalfa are the principal crops. Capability units IIe–1 dryland and IIe–6 irrigated; Silty Lowland range site; windbreak suitability group 4.

Humbarger Series

The Humbarger series consists of deep, nearly level, moderately well drained soils on high bottom lands in the Platte Valley. These soils formed in silty alluvium that was deposited over mixed sand and gravel. Depth to the seasonal high water table commonly ranges from about 6 feet in wet years to about 8 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 10 feet. These depths are greater where the soils are adjacent to foot slopes.

In a representative profile the surface layer is very friable, dark grayish-brown to grayish-brown loam about 26 inches thick. Beneath this is a buried soil that consists of 7 inches of very friable, very dark grayish-brown loam. Next is a 7-inch transition layer of very friable, dark grayish-brown sandy loam. The underlying material is calcareous, light brownish-gray coarse loam to a depth of 48 inches and is pale-brown mixed coarse sand and gravel to a depth of 60 inches.

Humbarger soils have moderate permeability and moderate available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Humbarger soils provide habitat for wildlife and areas for recreation.

Representative profile of Humbarger loam, gravelly substratum, in a cultivated field, 1,584 feet east and 100 feet south of the northwest corner of sec. 22, T. 14 N., R. 31 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak, medium and coarse, subangular blocky structure parting to weak, medium and fine, granular; soft, very friable; mildly alkaline; abrupt, smooth boundary.

A12—9 to 15 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine and medium, granular; soft, very friable; mildly alkaline; clear, smooth boundary.

A13—15 to 26 inches, grayish-brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; soft, very friable; mildly alkaline; abrupt, smooth boundary.

Ab—26 to 33 inches, very dark grayish-brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure; soft, very friable; mildly alkaline; clear, smooth boundary.

ACb—33 to 40 inches, dark grayish-brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; moderately alkaline; clear, smooth boundary.

C1ca—40 to 48 inches, light brownish-gray (10YR 6/2) coarse loam, dark grayish brown (10YR 4/2) moist; single grained; soft, loose; violent effervescence; moderately alkaline; clear, smooth boundary.

C2—48 to 60 inches, pale-brown (10YR 6/3) mixed coarse sand and gravel, dark brown (10YR 4/3) moist; single grained; loose; lime coatings on few large pebbles; neutral.

The A horizon is 20 to 40 inches thick. The Ab and ACb horizons are grayish-brown to very dark grayish brown loam, coarse sandy loam, light silty clay loam, or light clay loam. Thin layers of sandy loam are below depths of 30 inches in many places. Lime is leached to a depth of 40 inches or more. Depth to coarse sand and gravel ranges from 40 to 66 inches.

Humbarger soils are associated in the landscape with Silver Creek, Caruso, Cass, and McCook soils. They have less clay between depths of 10 and 40 inches than Silver Creek and Caruso soils and are slightly better drained than those soils. Humbarger soils have less sand in the upper part of the C horizon than Cass soils, and they have more clay in the upper part of the C horizon than McCook soils.

Humbarger loam, gravelly substratum (0 to 1 percent slopes) (Hz).—This soil is on high bottom lands in the Platte Valley, mainly between the North Platte and South Platte Rivers. It occurs in areas ranging from 30 to 300 acres in size.

Included with this soil in mapping were small areas of Cass fine sandy loam and Caruso loam. In places clay loam or sandy clay loam occurs between depths of 20 and 40 inches.

Runoff is slow. This is one of the best soils in Lincoln County for growing crops. It has few limitations, but soil blowing is a hazard when the surface dries following hard rains. Proper water management, improving tilth, and maintaining high fertility are the chief concerns of management.

Nearly all of the acreage of this soil is cultivated and most of this is irrigated. Corn and alfalfa are the principal crops. Smaller amounts of grain sorghum are grown. Capability units I–1 dryland and I–4 irrigated; Silty Lowland range site; windbreak suitability group 1.

Inavale Series

The Inavale series consists of deep, nearly level to moderately sloping, excessively drained soils on bottom lands in the Platte Valley. These soils formed in sandy alluvium that has been reworked in part by wind. Depth to the seasonal high water table ranges from 6 to 10 feet.

In a representative profile the surface layer is very friable,

grayish-brown loamy fine sand about 9 inches thick. Beneath this is a 6-inch layer of very friable, light brownish-gray loamy sand. The upper 16 inches of the underlying material is pale-brown to very pale brown fine sand, and the lower part is very pale brown loamy fine sand to a depth of 60 inches.

Inavale soils have rapid permeability and low available water capacity. These soils have low organic-matter content and low natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops irrigated under proper water management, but they are not suited to dry-farmed crops. They are suited to native grass and to trees and shrubs in windbreaks. Inavale soils provide habitat for wildlife and areas for recreation.

Representative profile of Inavale loamy fine sand, in native grass, 2,798 feet north and 1,056 feet west of the southeast corner of sec. 2, T. 13 N., R. 31 W.:

A—0 to 9 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure; soft, very friable; neutral; clear, smooth boundary.

AC—9 to 15 inches, light brownish-gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; soft, very friable; mildly alkaline; clear, smooth boundary.

C1—15 to 19 inches, pale-brown (10YR 6/3) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; mildly alkaline; abrupt, smooth boundary.

C2ca—19 to 31 inches, very pale brown (10YR 7/3) fine sand, light brownish gray (10YR 6/2) moist; single grained; loose; violent effervescence; mildly alkaline; clear, smooth boundary.

C3ca—31 to 60 inches, very pale brown (10YR 7/3) loamy fine sand, pale brown (10YR 6/3) moist; single grained; soft, loose; violent effervescence; moderately alkaline.

The A horizon is 7 to 17 inches thick and is light brownish gray to dark grayish brown. The AC horizon ranges from loamy sand to fine sand in texture and from 4 to 9 inches in thickness.

Inavale soils are associated in the landscape with Bankard loamy subsoil variant, Cass, and Platte soils. They are coarser textured between depths of 10 and 40 inches than the Bankard variant or Cass soils. Inavale soils are better drained and are deeper over mixed sand and gravel than Platte soils.

Inavale loamy fine sand (0 to 9 percent slopes) (In).—This soil is on bottom lands in the Platte Valley, mostly on narrow ridges that are slightly higher in elevation than the surrounding soils. It occurs in areas ranging from 10 to 50 acres in size.

Included with this soil in mapping were small areas of Cass soils, Cass variant, and Bankard loamy subsoil variant.

Runoff is slow. Most of the rainfall is absorbed about as rapidly as it falls. This soil is droughty. Where it is cultivated, soil blowing is a very severe hazard. Maintaining the organic-matter content and improving fertility are important concerns of management.

About one-third of the acreage of this soil is cultivated. Most of the remainder is in native grass. A few areas support stands of cottonwood trees. Capability units VIe-5 dryland and IVe-11 irrigated; Sandy Lowland range site; windbreak suitability group 3.

Lawet Series

The Lawet series consists of deep, nearly level, poorly drained and somewhat poorly drained soils that formed in recent alluvium on bottom lands in the Platte Valley (fig. 13). These soils have a seasonal high water table that ranges in depth from 1 to 4 feet.

Figure 13.—**Profile of Lawet silt loam, a deep, poorly drained soil that formed in alluvium.**

In a representative profile the surface layer is very friable to friable, dark-gray silt loam about 19 inches thick. Beneath this is a 6-inch transition layer of firm, gray silt loam. The underlying material is gray silt loam to a depth of 46 inches, light-gray loamy fine sand to a depth of 52 inches, and light-gray to gray clay loam to a depth of 60 inches. Distinct mottles are common below depths of 25 inches. Lime occurring largely as clay-sized particles is exceptionally abundant between depths of 6 and 34 inches. The soil is calcareous to a depth of 46 inches.

Lawet soils have moderate permeability and high available water capacity. These soils have moderate organic-matter content and medium natural fertility. They release moisture readily to plants, but the high lime-carbonate content results in a deficiency of available plant nutrients.

These soils are suited to cultivated crops under dryland or

irrigation management. They also are suited to grass and to trees and shrubs in windbreaks. Lawet soils provide habitat for openland and wetland wildlife and areas for recreation.

Representative profile of Lawet silt loam, drained, in a cultivated field, 1,056 feet north and 100 feet east of the southwest corner of sec. 29, T. 13 N., R. 28 W.:

Ap—0 to 6 inches, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist; weak, fine, granular structure; slightly hard, very friable; violent effervescence (6 percent calcium carbonate); moderately alkaline; abrupt, smooth boundary.

A12—6 to 19 inches, dark-gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak, medium, subangular blocky structure parting to moderate, medium, granular; slightly hard, friable; violent effervescence (15 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

AC—19 to 25 inches, gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; weak, medium, granular structure; slightly hard, firm; violent effervescence (21 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

C1—25 to 34 inches, gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; few, fine, distinct mottles, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, firm; violent effervescence (20 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

Ab—34 to 46 inches, gray (10YR 5/1) silt loam, very dark brown (10YR 2/2) moist; many, medium, distinct mottles, dark yellowish brown (10YR 4/4) moist; massive; very hard, firm; slight effervescence (less than 1 percent calcium carbonate); moderately alkaline; abrupt, smooth boundary.

IIC2g—46 to 52 inches, light-gray (10YR 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; many, medium, distinct mottles, yellowish brown (10YR 5/6) moist; single grained; soft, loose; salts; mildly alkaline; abrupt, smooth boundary.

IIIC3g—52 to 60 inches, 50 percent light-gray (5Y 7/1) and 50 percent gray (5Y 6/1) clay loam, 50 percent gray (N 5/0) and 50 percent gray (5Y 5/1) moist; few, medium, distinct mottles, yellowish brown (10YR 5/6) moist; massive; very hard, firm; mildly alkaline.

The A horizon is typically silt loam and fine sandy loam but in places is loam. It is 8 to 20 inches thick and is very dark gray to grayish brown. The AC horizon is 4 to 14 inches thick and is gray to light brownish gray. The C horizon is gray to very pale brown and ranges widely in texture. Below depths of 40 inches, it is commonly stratified with layers of silt loam, fine sandy loam, loamy fine sand, and clay loam. Buried soils are common in the C horizon. Mixed sand and gravel occurs in places at depths of 20 to 40 inches and is common below a depth of 60 inches. Lime carbonate content ranges from 5 percent in the A horizon to as much as 50 percent in the upper part of the C horizon.

Lawet soils are associated in the landscape with Wann, Elsmere, Alda, and Lex soils and with Wet alluvial land and Slickspots. They are finer textured than the associated soils and have more lime carbonate in the upper part of the C horizon. Lawet soils are deeper over mixed sand and gravel than Alda or Lex soils. They are better drained than Wet alluvial land and are coarser textured in the B horizon than Slickspots.

Lawet fine sandy loam, drained (0 to 1 percent slopes) (La).—This somewhat poorly drained soil is on bottom lands where about 8 inches of fine sandy loam has been deposited as overwash on the surface. It occurs in areas ranging from 10 to 100 acres in size. The profile of this soil is similar to the one described as representative of the Lawet series, except that the upper part of the surface layer is fine sandy loam. In places the soil is slightly acid or medium acid below a depth of 4 feet. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet.

Included with this soil in mapping were small areas of Wann fine sandy loam, the drained Lawet silt loam, and the Cass variant. Also included were a few small areas of Lawet soils that are affected by very strong alkalinity and high soluble salt content. These are at slightly lower elevations.

Runoff is very slow. Some areas are occasionally flooded. Spring tillage and planting are commonly delayed by wetness and cool soil temperatures. Where this soil is irrigated, maintaining fertility and proper water management are concerns. If the surface is left unprotected, soil blowing is a hazard.

Most of the acreage of this soil is cultivated under irrigation. Corn, alfalfa, and grain sorghum are the principal crops. A small acreage is in native grass and is used for hayland. Capability units IIIw-6 dryland and IIIw-5 irrigated; Subirrigated range site; windbreak suitability group 2.

Lawet silt loam (0 to 1 percent slopes) (Lb).—This poorly drained soil is on bottom lands in the Platte Valley and on flood plains of a few small streams. It occurs in areas ranging from 10 to 400 acres in size. The profile of this soil is similar to the one described as representative of the Lawet series, except that the lower part of the surface layer has a higher content of lime carbonate. In places the soil has an acid reaction below a depth of 4 feet. Depth to the seasonal high water table ranges from about 1 foot in wet years to about 3 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 4 feet.

Included with this soil in mapping were small areas of Wet alluvial land and Muck at lower elevations and small areas of the drained Lawet silt loam at higher elevations.

Runoff is slow. A few areas are occasionally flooded. This soil is one of the last in the county to warm up and dry sufficiently to permit spring tillage. Planting is difficult because of wetness. In places drainage is hard to establish because suitable outlets are not available. The high lime-carbonate content and moderate alkalinity result in deficiencies of nutrients needed by plants. Maintaining fertility is an important concern of management.

Most of the acreage of this soil is in native grass and is used for hay or pasture. Alfalfa has been established in a few areas by interseeding with native grass, but such stands generally last only 2 to 3 years. Capability unit IVw-4 dryland; Subirrigated range site; windbreak suitability group 6.

Lawet silt loam, drained (0 to 1 percent slopes) (Lc).—This somewhat poorly drained, silty soil is on bottom lands of the Platte Valley, on low stream terraces, and on a few narrow flood plains along small streams. It occurs in areas ranging from 10 to 600 acres in size. The profile of this soil is the one described as representative of the Lawet series. In a few areas the surface layer is silty clay loam. The typical accumulation of lime carbonate near the surface is lacking in areas of this soil in the southern part of the county. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet.

Included with this soil in mapping were small areas of Wann loam, Silver Creek loam, and the saline-alkali Lawet silt loam. Also included were a few areas of soils that have a profile like Hord soils, except that they are moderately wet as a result of seepage from adjacent areas.

Runoff is slow. Occasional flooding occurs in some areas.

This soil becomes warm later in spring than better drained soils. Tillage and planting commonly are delayed by wetness. Where the soil is irrigated, improving the fertility and proper water management are important concerns.

Most of the acreage of this soil is cultivated under irrigation management. A few areas are in native grass and are used for hay or pasture. Corn and alfalfa are the principal crops. Capability units IIIw–4 dryland and IIIw–6 irrigated; Subirrigated range site; windbreak suitability group 2.

Lawet silt loam, saline-alkali (0 to 1 percent slopes) (Ld).—This somewhat poorly drained soil is on bottom lands in the Platte Valley. It occurs in areas ranging from 20 to 400 acres in size. The profile of this soil is similar to the one described as representative of the Lawet series, except that in places the surface layer is fine sandy loam and in a few areas the soil material is only 20 to 40 inches thick over mixed sand and gravel. The upper 20 inches of soil is very strongly alkaline in about 15 percent of the area, is strongly alkaline in about 45 percent of the area, and is moderately alkaline in 40 percent of the area. About 15 percent of these areas are moderately to strongly affected by excess soluble salts in the upper 10 inches of the soil. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of 5 feet.

Runoff is slow. Intake of moisture is slow in the very strongly alkaline areas. Workability is poor because of the wetness and poor tilth. The salinity and alkalinity are the principal limitations of this soil. Maintaining the fertility is a serious concern of management. Where the soil is irrigated, it responds well to applications of sulfur, phosphate, and nitrogen.

Most of the acreage of this soil is in native grass and is used as pasture or hayland. A few areas are cultivated and most of these are irrigated. Sugar beets and alfalfa are the principal crops. Smaller amounts of corn and grain sorghum are grown. Capability units IVs–1 dryland and IIIs–4 irrigated; the strongly and very strongly alkaline part is in the Saline Subirrigated range site and the moderately alkaline part is in the Subirrigated range site; windbreak suitability group 8.

Lawet-Slickspot complex (0 to 1 percent slopes) (Le).—This somewhat poorly drained complex is on bottom lands in the Platte Valley. It occurs in areas ranging from 10 to 300 acres in size. About 55 percent of the complex is the Lawet saline-alkali silt loam and about 45 percent is Slickspots. The Lawet soil has a profile similar to the one described as representative of the Lawet series, except that the surface layer is strongly to very strongly alkaline. Slickspots are as described for the Slickspots land type. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet.

Included with this complex in mapping were small depressions that are occasionally ponded for short periods.

Runoff is slow to very slow. Permeability is slow in the Slickspots part of the areas. The strong to very strong alkalinity limits nutrient availability and results in crop deficiencies. Soil materials in this complex are difficult to work, because they are hard when dry and plastic when moist.

Most of the acreage of this complex is in native grass and is used for hayland or pasture. A few areas are cultivated but crop response generally is poor. Many areas formerly cultivated are seeded to tall wheatgrass and these afford good grazing. Capability units IVs–1 dryland and IVs–4 irrigated; Saline Subirrigated range site; windbreak suitability group 8.

Lawet Variant

The Lawet variant consists of nearly level, poorly drained soils that are moderately deep over mixed sand and gravel. They occupy long, narrow areas along creeks and in abandoned river channels on bottom lands in the Platte Valley. Depth to the seasonal high water table ranges from about 1 foot in wet years to about 3 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet.

In a representative profile the 16-inch surface layer is friable loam that is dark gray in the upper part and gray in the lower part. Beneath this the upper part of the underlying material, to a depth of 30 inches, is gray to light-gray loam that has distinct, light yellowish-brown mottles. The lower part is light-gray coarse sand and gravel to a depth of 60 inches. The soil above the coarse sand and gravel has a high accumulation of calcium carbonate.

Permeability in the Lawet variant soils is moderate in the loam material but is very rapid in the underlying sand and gravel. These soils have low available water capacity, moderate organic-matter content, and medium fertility. They absorb moisture easily and release it readily to plants.

Lawet variant soils are marginally suited to cultivated crops under dryland management. They are better suited to grass, trees, and shrubs. These soils provide habitat for wildlife and areas for recreation.

Representative profile of Lawet loam, gravelly subsoil variant, in native pasture, 125 feet west and 200 feet north of the southeast corner of sec. 11, T. 13 N., R. 31 W.:

A11—0 to 9 inches, dark-gray (10YR 4/1) loam, black (10YR 2/1) moist; weak, medium and fine, granular structure; slightly hard, friable; violent effervescence (13 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

A12—9 to 16 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak, medium, subangular blocky structure parting to weak, medium and fine, granular; slightly hard, friable; violent effervescence (17 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

C1g—16 to 23 inches, gray (10YR 6/1) loam, dark gray (10YR 4/1) moist; few, fine, distinct mottles, light yellowish brown (10YR 6/4) moist; weak, medium, subangular blocky structure; hard, firm; violent effervescence (40 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

C2g—23 to 30 inches, light-gray (2.5Y 7/0) loam, gray (2.5Y 5/0) moist; common, medium, distinct mottles, light yellowish brown (10YR 6/4) moist; massive; very hard, firm; violent effervescence (29 percent calcium carbonate); moderately alkaline; abrupt, smooth boundary.

IIC3g—30 to 60 inches, light-gray (5Y 7/2) coarse sand and gravel, gray (5Y 5/1) moist; single grained; loose; mildly alkaline.

The A horizon is 16 to 20 inches thick and is dark gray to gray. The upper part of the C horizon is 16 to 20 inches thick and is gray or light gray. Depth to coarse sand and gravel ranges from 20 to 40 inches. Lime carbonate content is from 15 to 35 percent.

Lawet variant soils are associated in the landscape with Wet alluvial land and with Lex and Lawet soils. They are better drained than Wet alluvial land and are not as well drained as Lex soils. Lawet variant soils have a higher accumulation of lime carbonate than Lex soils. They are not as deep over coarse sand and gravel as typical Lawet soils.

Lawet loam, gravelly subsoil variant (0 to 1 percent

slopes) (Lf).—This soil is moderately deep over mixed sand and gravel on bottom lands in the Platte Valley. It occurs in low areas ranging from 5 to 160 acres in size.

Included with this soil in mapping were small areas of Wet alluvial land, Lex loam, and the saline-alkali Lex loam.

Runoff is slow. Wetness is the principal limitation. Tillage and planting are delayed in spring. Because the soil warms slowly, germination is delayed and crops commonly fail to mature before the first frost. Providing adequate internal drainage is an important concern of management. Drainage outlets are not available in some places.

Most of the acreage of this soil is in native grass that provides excellent grazing. A small part is in alfalfa and clover that has been interseeded into native grass, but these stands last for only 2 to 3 years. Row crops generally are not well suited. Capability unit IVw–4 dryland; Subirrigated range site; windbreak suitability group 6.

Lex Series

The Lex series consists of nearly level, somewhat poorly drained soils on bottom lands in the Platte Valley. These soils formed in silty alluvium and are moderately deep over mixed sand and gravel. Depth to the seasonal high water table commonly ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late in summer, the water table sometimes lowers to a depth of about 5 feet. Where these soils are on the higher parts of the bottom lands, seasonal depths to the water table are slightly greater.

In a representative profile the surface layer is very friable, dark-gray to gray loam about 14 inches thick. Beneath this the upper part of the underlying material is gray and light brownish-gray loam and very fine sandy loam to a depth of 27 inches, the middle part is gray and greenish-gray silty clay to a depth of 30 inches, and the lower part is very pale brown to brownish-yellow, mixed coarse sand and gravel to a depth of 60 inches. A high accumulation of lime carbonate is present in the lower part of the surface layer and upper part of the underlying material.

Permeability in Lex soils is moderate in the surface layer and upper part of the underlying material and is very rapid in the underlying sand and gravel. These soils have low available water capacity, moderately low organic-matter content, and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Lex soils provide habitat for wildlife and areas for recreation.

Representative profile of Lex loam in a cultivated field, 1,848 feet north and 100 feet west of the southeast corner of sec. 7, T. 14 N., R. 32 W.:

Ap—0 to 10 inches, dark-gray (10YR 4/1) loam, very dark brown (10YR 2/2) moist; weak, medium and coarse, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; violent effervescence (5 percent calcium carbonate); moderately alkaline; abrupt, smooth boundary.

A12—10 to 14 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak, medium and coarse, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; violent effervescence (13 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

C1—14 to 20 inches, gray (10YR 6/1) loam, dark gray (10YR 4/1) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; violent effervescence (17 percent lime carbonate); moderately alkaline; clear, smooth boundary.

C2—20 to 27 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; few, fine, distinct mottles, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable; few, dark worm casts; moderately alkaline; abrupt, smooth boundary.

IIC3—27 to 30 inches, 50 percent gray (2.5Y 5/0) and 50 percent greenish-gray (5GY 6/1) silty clay, 50 percent dark gray (2.5Y 4/0) and 50 percent greenish gray (5GY 5/1) moist; weak, medium, subangular blocky structure; very hard, very firm; moderately alkaline; abrupt, smooth boundary.

IIIC4—30 to 60 inches, mixed very pale brown (10YR 7/3) and brownish-yellow (10YR 6/6) coarse sand and gravel, mixed pale brown (10YR 6/3) and yellowish brown (10YR 5/6) moist; single grained; loose; mildly alkaline.

The A horizon is 7 to 18 inches thick and is gray, dark gray, or grayish brown. The upper part of the C horizon is gray, light brownish gray, or greenish gray and ranges from fine sandy loam to silty clay in texture. It is stratified in many places but is mostly medium textured. Depth to coarse sand and gravel ranges from 20 to 40 inches.

Lex soils are associated in the landscape with Lawet, Wann, Platte, Elsmere, and Alda soils. They are better drained than Lawet soils and are finer textured than Wann soils. Lex soils are deeper over coarse sand and gravel than Platte soils. They have coarse sand and gravel in the lower part of the C horizon whereas Elsmere soils have fine sand at comparable depths. The AC horizon is missing in Lex soils but is present in Alda, Elsmere, and Lawet soils.

Lex loam (0 to 1 percent slopes) (Lg).—This soil is in former river channels and in other low-lying bottom-land areas in the Platte Valley. It is 20 to 40 inches deep over mixed sand and gravel and occurs in areas ranging from 10 to 600 acres in size. The profile of this soil is the one described as representative of the Lex series.

Included with this soil in mapping were small areas of Platte soils at lower elevations and small areas of Lawet silt loam and Wann loam at higher elevations. Also included were better drained, moderately deep, brown soils at higher elevations. These soils have dark grayish-brown to light brownish-gray clay loam underlying material.

Runoff is slow. After heavy rains or excessive snow melt, mainly in the spring, the lower areas occasionally are flooded. Wetness is the main limitation. Because this soil is slow to dry out and warm up, tillage and planting are delayed in spring. Where dryfarmed, the soil tends to be droughty late in summer when the water table generally is at its lowest level. Because of the moderately high lime-carbonate content, improving the fertility is a concern of management.

About half of the acreage of this soil is cultivated and most of this is irrigated. The remainder is in native grass. Corn and alfalfa are the principal crops. Capability units IIIw–4 dryland and IIIw–7 irrigated; Subirrigated range site; windbreak suitability group 2.

Lex loam, saline-alkali (0 to 1 percent slopes) (Lh).—This loamy soil generally occurs close to the present channel of the Platte River or in former river channels that cross the lower bottom lands in the Platte Valley. Areas of this soil range from 20 to 300 acres in size. The profile of this soil is similar to the one described as representative of the Lex series, except that the surface layer and underlying material are more strongly alkaline and accumulations of soluble salts are more common. About 60 percent of the acreage is strongly to very strongly alkaline.

Included with this soil in mapping were small areas of the saline-alkali Lawet silt loam at higher elevations, small areas

of Platte loam at lower elevations, and small areas of Wann loam at about the same elevation.

Runoff is slow. The lower areas occasionally are flooded after rains. Because this soil is slow to dry out and warm up, tillage and planting are delayed in spring. Where it is dryfarmed, the soil is droughty late in summer when the water table is at its lowest depth. Excess alkalinity is the main limitation. Improving and maintaining the fertility are concerns of management.

Most of the acreage of this soil is in native grass that is used for grazing. A small acreage is cultivated. Corn and alfalfa are the principal irrigated crops and alfalfa is the principal dryfarmed crop. Capability units IVs–1 dryland and IIIs–7 irrigated; the strongly and very strongly alkaline part is in the Saline Subirrigated range site, and the moderately alkaline part is in the Subirrigated range site; windbreak suitability group 8.

Loup Series

The Loup series consists of deep, poorly drained, nearly level to very gently sloping soils that formed in alluvium. These soils occur in narrow drainageways in the sandhills and on bottom lands in the Platte Valley. Depth to the seasonal high water table ranges from about 0 to 2 feet.

In a representative profile about 2 inches of partly decomposed organic matter is on the surface of the mineral soil. The surface layer is very friable, dark-gray loam about 8 inches thick. Beneath this the underlying material is light-gray mottled sand to a depth of 60 inches.

Loup soils have rapid permeability and low available water capacity. These soils have low organic-matter content and low natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to grass and trees. They provide habitat for wildlife and areas for recreation. Loup soils are too wet for the cultivated crops that are common in the area.

Representative profile of Loup loam in an area of Loup complex in native range, 1,056 feet west and 1,056 feet north of the southeast corner of sec. 5, T. 14 N., R. 30 W.:

O—2 inches to 0, partly decomposed roots and leaves; neutral; clear, smooth boundary.

A—0 to 8 inches, dark-gray (10YR 4/1) loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; neutral; abrupt, wavy boundary.

IIC—8 to 60 inches, light-gray (10YR 7/1) sand, light brownish gray (2.5Y 6/2) moist; few, medium, distinct mottles, yellowish brown (10YR 5/6) moist; single grained; loose; mildly alkaline.

The A horizon is loamy fine sand along the upper reaches of streams in the sandhills and is loam on the bottom land of the Platte Valley. It is 4 to 12 inches thick. The C horizon is loamy fine sand or sand and is gray to light brownish gray.

Loup soils are associated with Lawet and Elsmere soils and with Wet alluvial land on bottom lands and with Dunday and Valentine soils in the sandhills. Depth to the water table is 0 to 2 feet in Loup soils, 2 to 5 feet in Lawet and Elsmere soils, and is more than 10 feet in Dunday and Valentine soils. Loup soils are coarser textured than Wet alluvial land.

Loup complex (0 to 3 percent slopes) (Lo).—Soils of this complex are on long narrow alluvial flood plains in the sandhills and in irregularly shaped areas on bottom lands in the Platte Valley. These areas range from 5 to 150 acres in size. About 70 percent of the complex is in the lower areas and consists of Loup soils that have a loam surface layer. The remaining 30 percent is on the higher areas and consists of soils similar to Loup soils except they have a thin, light colored loamy fine sand surface layer.

Included with this complex in mapping were small areas of Elsmere loamy fine sand, Wann loam, and Lawet silt loam at slightly higher elevations. Also included were small areas of Marsh at lower elevations.

Runoff is very slow or lacking. Excessive wetness is the principal limitation. The high water table limits growth of grass roots. Improved drainage along the narrow sandhill drainageways would lower the production of range plants. Drainage on the bottom lands commonly is difficult to establish because adequate outlets are not available.

Nearly all of the acreage of this soil is in native grass. The soil is too wet for the commonly grown cultivated crops. Capability unit Vw–7 dryland; Wet Land range site; windbreak suitability group 6.

Marsh

Marsh (0 to 1 percent slopes) (Ma) consists of nearly level, very poorly drained soil material on bottom lands along the Platte River and smaller streams. It also occurs on uplands in depressions and swales on uplands near the Sutherland Reservoir. The soil material in Marsh is medium to moderately coarse textured. Water is over the surface during a major part of the growing season and commonly is as much as 6 inches deep. During the summer, in dry years, the depth to the water table is about 2 feet in places.

On bottom lands of the Platte Valley, Marsh is associated with Muck, Lawet soils, and Wet alluvial land at higher elevations. Small areas of these soils and land types are included with Marsh in mapping.

The organic-matter content of Marsh is high. Wetness is a very severe limitation. Marsh is not suited to cultivated crops, grass, trees, or shrubs. Small areas of Marsh are open water, and the remaining areas are covered with native vegetation that consists mainly of bullrushes, common reedgrass, cattails, willows, and other aquatic plants.

Marsh is used almost exclusively as habitat for wetland wildlife and as areas for recreation. Capability unit VIIIw–7 dryland; not assigned to a range site; windbreak suitability group 10.

McCook Series

The McCook series consists of deep, moderately well drained soils that are nearly level to very gently sloping. These soils are on bottom lands in the valleys of the Platte River and Wildhorse Creek. They also are along narrow drainageways in the loess hills. Depth to the seasonal high water table ranges from about 4 feet in wet years to about 15 feet in dry years.

In a representative profile the surface layer, about 10 inches thick, is very friable gray loam in the upper part and very friable gray very fine sandy loam in the lower part. Beneath this, the 2-inch transition layer is very friable, grayish-brown very fine sandy loam. The underlying material is light brownish-gray to light-gray very fine sandy loam to a depth of 38 inches and light-gray fine sand to a depth of 60 inches. Lime carbonate is leached to a depth of 20 inches.

McCook soils have moderate permeability and moderate available water capacity. These soils have moderate organic-matter content and high natural fertility. Except for the saline-alkali phase, they absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. McCook soils provide habitat for wildlife and areas for recreation.

Representative profile of McCook loam in a cultivated field, 200 feet north and 150 feet east of the center of sec. 35, T. 12 N., R. 26 W.:

Ap—0 to 5 inches, gray (10YR 5/1) loam, very dark brown (10YR 2/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; soft, very friable; mildly alkaline; clear, smooth boundary.

A12—5 to 10 inches, gray (10YR 5/1) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; soft, very friable; mildly alkaline; clear, smooth boundary.

AC—10 to 12 inches, grayish-brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine, granular; soft, very friable; few, light colored worm casts; mildly alkaline; clear, smooth boundary.

C1—12 to 20 inches, light brownish-gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak, medium, subangular blocky structure; soft, very friable; few, dark worm casts; moderately alkaline; gradual, smooth boundary.

C2—20 to 29 inches, light brownish-gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak, medium, subangular blocky structure; soft, very friable; strong effervescence; moderately alkaline; gradual, smooth boundary.

C3—29 to 32 inches, light brownish-gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak, medium and fine, platy structure; soft, very friable; few, small, soft lime accumulations; violent effervescence (7 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

C4—32 to 38 inches, light-gray (10YR 7/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable; strong effervescence; moderately alkaline; clear, smooth boundary.

C5—38 to 60 inches, light-gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; single grained; loose; moderately alkaline.

The A horizon is typically loam but in a few places is fine sandy loam or very fine sandy loam. It is 9 to 18 inches thick. The AC horizon is dark grayish-brown to grayish-brown loam or very fine sandy loam and is 2 to 8 inches thick. Loamy fine sand and fine sand are between depths of 38 and 60 inches. Depth to lime ranges from 16 to 24 inches and accumulations of lime are common in the C horizon. McCook soils in Lincoln County are less calcareous in the A horizon and more clayey in the upper part of the C horizon than the defined ranges for those horizons in the McCook series elsewhere.

McCook soils are associated in the landscape with drained Lawet, Wann, Cass variant, Humbarger, and Hobbs soils. They are better drained than the Lawet and Wann soils. McCook soils are finer textured in the upper part of the C horizon than Wann or Cass variant soils. They have a thinner A horizon than Humbarger and Hobbs soils and are more stratified in the upper part of the C horizon than Humbarger soils.

McCook loam (0 to 2 percent slopes) (Mb).—This nearly level to very gently sloping soil is on some of the higher bottom lands in the valleys of the Platte River and Wildhorse Creek. It occurs in areas ranging from 10 to 100 acres in size. The profile of this soil is the one described as representative of the McCook series.

Included with this soil in mapping were small areas of the Cass variant and Cozad soils at slightly higher elevations. Also included were areas on long, low ridges on the bottom land where the surface layer is fine sandy loam.

Runoff is slow. Where this soil is dryfarmed, lack of adequate moisture late in summer limits crop production. This is one of the best soils in Lincoln County for growing crops. It is friable and easy to work. Maintaining high fertility is an important concern of management.

Nearly all of the acreage of this soil is cultivated and most of this is irrigated. Corn, grain sorghum, and alfalfa are the principal crops. Capability units I–1 dryland and I–6 irrigated; Silty Lowland range site; windbreak suitability group 1.

McCook loam, saline-alkali (0 to 1 percent slopes) (Mc).—This soil is on some of the highest bottom lands and occurs in areas ranging from 10 to 200 acres in size. The profile of this soil is similar to the one described as representative of the McCook series, except that lime is closer to the surface and the soil is more alkaline. About 10 percent is strongly alkaline, 55 percent is moderately alkaline, and the remaining 35 percent is mildly alkaline. Depth to the water table ranges from 4 to 6 feet.

Included with this soil in mapping were some areas of soils that have a silt loam surface layer, some that have a leached, gray subsurface layer, and some that have clay loam or fine sandy loam underlying material.

Runoff is slow. Excessive alkalinity is the principal limitation. In places the surface layer is difficult to work because of the high content of sodium. Maintaining a high level of fertility and reducing alkalinity are important concerns of management.

Most of the acreage of this soil is in native grass and is used for grazing. A small acreage is cultivated under irrigation management. Alfalfa and grass are the principal crops. Capability units IVs–1 dryland and IIIs–6 irrigated; the moderately to strongly alkaline part is in the Saline Lowland range site, and the mildly alkaline part is in the Silty Lowland range site; windbreak suitability group 8.

Muck

Muck (0 to 1 percent slopes) (Mu) consists of nearly level, poorly drained soil material that occurs in old depressions and in areas that were once shallow lakes. These areas range from 10 to 200 acres in size. Muck is dark-colored, stratified silty and loamy material deposited over layers of peat or sand. Organic matter makes up from 10 to 15 percent of the material in the upper 40 inches. The surface generally is flooded in the spring, and the water table declines to a depth of about 40 inches late in summer.

Included with Muck in mapping were small areas of Wet alluvial land and Marsh at slightly lower elevations.

Runoff is very slow or lacking. Excessive wetness is the principal limitation. This soil material is not suited to cultivated crops, trees, or shrubs. Native vegetation consists mainly of prairie cordgrass, sedges, and reedgrass.

Most of the acreage of Muck is in native grass that is used for hay or pasture. Muck is used as a top dressing in landscaping around homes in urban areas. Peat has been mined in some places. Capability unit Vw–7 dryland; Wet Land range site; windbreak suitability group 6.

Platte Series

The Platte series consists of nearly level to very gently sloping, somewhat poorly drained soils that are shallow over mixed sand and gravel. These soils formed in silty and loamy alluvium on bottom lands in the Platte Valley. They occupy former river channels and are at lower elevations than the associated soils. Depth to the seasonal high water table

ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late summer, the water table sometimes lowers to a depth of 5 feet.

In a representative profile the surface layer is very friable, grayish-brown loam about 7 inches thick. Beneath this is a 4-inch transition layer of very friable, light brownish-gray loam. The underlying material is light brownish-gray fine sandy loam to a depth of 14 inches and light-gray mixed sand and gravel to a depth of 60 inches. These soils are calcareous above the sand and gravel.

Platte soils have moderate permeability in the upper part of the profile and very rapid permeability in the mixed sand and gravel. These soils have very low available water capacity, low organic-matter content, and low natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under irrigation management but are droughty under dryland conditions, particularly late in summer. Platte soils are suited to grass and to trees and shrubs in windbreaks. They provide habitat for wildlife and areas for recreation.

In Lincoln County, Platte soils are not mapped separately but are in a complex with Alda soils.

Representative profile of Platte loam in an area of Platte-Alda complex in native range, 528 feet west and 1,056 feet south of the northeast corner of sec. 18, T. 12 N., R. 27 W.:

A—0 to 7 inches, grayish-brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; weak, fine, granular structure; soft, very friable; violent effervescence (7 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

AC—7 to 11 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; soft, very friable; violent effervescence (6 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

C1—11 to 14 inches, light brownish-gray (10YR 6/2) fine sandy loam, brown (10YR 5/3) moist; weak, medium, subangular blocky structure; soft, very friable; strong effervescence; moderately alkaline; abrupt, smooth boundary.

IIC2—14 to 60 inches, light-gray (10YR 7/2) sand and gravel, light brownish gray (10YR 6/2) moist; single grained; loose; mildly alkaline.

The A horizon is typically loam but is fine sandy loam or silty clay loam in places. It is 4 to 13 inches thick. The AC horizon is stratified. It is fine sandy loam or silty clay loam, 4 to 8 inches thick, and gray to light brownish gray. The C1 horizon is fine sandy loam or very fine sandy loam. Depth to the IIC horizon ranges from 10 to 20 inches.

Platte soils are associated in the landscape with Alda, Lawet, Wann, and Bankard variant soils and with Gravelly alluvial land. They are shallower over sand and gravel than any of the associated soils. Platte soils have a coarser textured C1 horizon than Lawet soils. The water table is higher in Platte soils than in the Bankard variant soils but is lower than in Gravelly alluvial land.

Platte-Alda complex (0 to 2 percent slopes) (Pa).—This complex consists mainly of Platte soils, which are shallow over mixed sand and gravel, and Alda soils, which are moderately deep over mixed sand and gravel. These are nearly level to very gently sloping, somewhat poorly drained soils that are 10 to 40 inches deep. They occur in abandoned channels on bottom lands in the Platte Valley. Areas of this complex range from 10 to 400 acres in size, and most are crossed by shallow intermittent drainageways. About 70 percent of the complex is Platte loam, which generally is in the lower areas, and about 30 percent is Alda loam or Alda fine sandy loam, which are at slightly higher elevations.

Included with this complex in mapping were small areas of Bankard variant, Lawet gravelly subsoil variant, and Gravelly alluvial land.

Runoff is slow. Wetness is the principal limitation. The water table generally is at its highest level in the spring. Occasional flooding occurs, particularly in the low channelled areas. Because of the low and very low available water capacity, soils in this complex are droughty late in summer and in the fall when the water table is at its lowest level. The coarse sand and gravel at shallow to moderate depths limits root growth and penetration.

Most of the acreage of this complex is in native grass that is used for hay and pasture. A small acreage is cultivated under irrigation management. Alfalfa and bromegrass are the principal crops. Sand and gravel pits are in some areas. Capability units VIw-4 dryland and IVw-13 irrigated; Subirrigated range site; windbreak suitability group 2.

Riverwash

Riverwash (0 to 3 percent slopes) (Ra) is a nearly level to very gently sloping, poorly drained land type consisting of islands and sandbars adjacent to channels of the Platte River. It occurs in areas ranging from 20 to several hundred acres in size. The soil material in Riverwash consists mostly of alluvial sand and gravel. The water table is at the same level as the river and commonly is between the surface and a depth of about 3 feet.

Runoff is very slow or ponded. The lower areas frequently are flooded. Because the soil material is so coarse textured and droughty, about half of the acreage is barren. Vegetation on the remaining acreage is sparse. It consists mainly of willows and reeds in the lower areas and of brushy plants in the higher areas. Riverwash is not suited to cultivation or to pasture.

Riverwash is used mostly by openland and wetland wildlife. It provides areas for recreation. Good sites for duck blinds are available in places. Capability unit VIIIs-7 dryland; not assigned to a range site; windbreak suitability group 10.

Rough Broken Land, Loess

Rough broken land, loess (15 to 60 percent slopes) (Rb) is a steep to very steep, excessively drained land type in canyons of the loess upland (fig. 14). It occurs in areas ranging from 40 to more than 500 acres in size. About 60 percent of this land type is on very steep areas of Peoria loess, parts of which are not vegetated; about 25 percent is Coly soils, 5 percent is Uly soils, and the remaining 10 percent is other soils.

Included with this land type in mapping were areas of Hobbs soils on the narrow, silty bottom lands of the canyons. Also included were small areas of Hersh soils adjacent to sandhills.

The soil material in Rough broken land, loess, is medium textured. Permeability is moderate and the available water capacity is high. The organic-matter content is low or very low and the natural fertility is low.

Runoff is very rapid. Erosion by water is the principal hazard. Severe erosion occurs where vegetation is sparse and, in places, results in secondary cutting on the slopes and in deep, uncrossable gullies in the bottoms of the canyons. Reseeding to prevent erosion is not possible on the very steep areas.

Figure 14.—**This area of Rough broken land, loess, is made up mainly of the Coly soils on vegetated hillsides and unaltered Peoria loess on very steep areas that are not vegetated.**

Most of the acreage on the less steep areas is in native grass used for grazing. Grass on some of the narrow canyon floors is mowed for hay. Trees grow in the canyon areas, the best growth being on the cooler north- and northwest-facing slopes. A small acreage on the narrow bottom lands is cultivated. Forage sorghum and alfalfa are the principal crops. Rough broken land, loess, provides habitat and protection for wildlife and areas for recreation. Capability unit VIIe-7 dryland; Thin Loess range site; windbreak suitability group 10.

Scott Series

The Scott series consists of deep, nearly level, poorly drained soils in closed depressions on the loess uplands. A dense claypan subsoil near the surface limits root growth and water movement. These soils are frequently flooded by runoff from soils at higher elevations.

In a representative profile the surface layer is friable, dark grayish-brown silt loam about 2 inches thick. Beneath this the upper 7 inches of subsoil is very firm, dark-brown light silty clay and the lower 28 inches is very firm, very dark-gray silty clay. The underlying material is gray silty clay to a depth of 60 inches.

Scott soils have very slow permeability and moderate available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture slowly and release it slowly to plants.

These soils are suited to cultivated crops but surface drainage is desirable for satisfactory production. Unless drained, they are not suited to grass or trees. Scott soils provide habitat for wildlife and areas for recreation.

Representative profile of Scott silt loam in an area of Scott soils, 1,267 feet north and 110 feet east of the southwest corner of sec. 19. T. 9 N., R. 34 W.:

A2—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium and thick, platy structure; slightly hard, friable; neutral; clear, smooth boundary.

B21t—2 to 9 inches, dark-brown (10YR 4/3) light silty clay, dark brown (10YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm; neutral; clear, smooth boundary.

B22t—9 to 37 inches, very dark-gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate, medium, blocky structure; very hard, very firm; mildly alkaline; clear, smooth boundary.

C—37 to 60 inches, gray (10YR 5/1) silty clay, dark gray (10YR 4/1) moist; weak, medium, subangular blocky structure; very hard, very firm; moderately alkaline.

Thickness of the solum is 24 to 58 inches. The A2 horizon is typically silt loam but is silty clay loam in places. It is 1 to 8 inches thick and is gray or dark gray in areas that have not been plowed or distrubed for a long time. The B2t horizon is silty clay or clay. The C horizon is silty clay, loam, fine sandy loam, or loamy fine sand.

Scott soils are associated in the landscape with Fillmore, Hord, and Holdrege soils. They have a thinner A horizon than Fillmore soils and are ponded for longer periods. The A2 horizon that is present in Scott soils is lacking in Hord and Holdrege soils. Scott

soils have more clay in the B horizon than Hord and Holdrege soils. They occur at lower elevations than any of the associated soils.

Scott soils (0 to 1 percent slopes) (Sc).—These soils are in upland depressions in loess and sand-loess transition areas. They occur in areas ranging from less than 5 acres to 180 acres in size. Those areas smaller than 5 acres are indicated on the detailed soil map by a special spot symbol. The surface layer of Scott soils consists of silt loam and silty clay loam. In small areas the lower subsoil includes some stratified silty clay and clay. In places the underlying material is loam, fine sandy loam, or loamy fine sand. About 15 percent of the mapping unit is Fillmore soils.

Included with these soils in mapping were small areas of Hord soils at higher elevations.

Runoff is lacking except in areas that are artificially drained. Wetness is a very severe hazard. These soils frequently are flooded by runoff from adjacent soils at higher elevations. During seasons of above-average rainfall, intermittent lakes occupy the lower elevations and crops commonly die from drowning. Because the surface layer is thin, tilling generally mixes part of the very firm subsoil into the plowed layer. Tilth in cultivated areas is poor. The claypan subsoil is difficult for plant roots to penetrate. During late summer, when rainfall commonly is low, these soils can be droughty and soil blowing is a hazard where the surface is unprotected.

Much of the acreage has been cultivated, but generally these soils are left idle or are used for whatever pasture they afford. In most areas the vegetation consists mostly of ironweed, smartweed, and aquatic plants. Forage or grain sorghum is planted in a few areas in late spring and fair to good stands are produced if moisture is timely and adequate. When the water supply is adequate, Scott soils provide cover and habitat for wetland wildlife. Capability unit IVw-2 dryland; not assigned to a range site; windbreak suitability group 10.

Silver Creek Series

The Silver Creek series consists of deep, nearly level, somewhat poorly drained soils that formed in silty and clayey alluvium on bottom lands in the Platte Valley. Depth to the seasonal high water table ranges from about 3 feet in wet years to about 5 feet in dry years. During the driest part of the year, generally late summer, the water table sometimes declines to a depth of 6 feet.

In a representative profile the surface layer is friable, dark-gray silt loam about 9 inches thick. Beneath this the subsoil is friable, dark-gray silty clay loam in the upper 9 inches, very firm to firm, grayish brown to light-gray silty clay in the middle 16 inches, and friable, light brownish-gray clay loam in the lower 5 inches. The underlying material, to a depth of 46 inches, is light brownish-gray sand and, to a depth of 60 inches, is very pale brown sand and gravel.

Silver Creek soils have slow permeability and moderate available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily until the surface layer is saturated, after which absorption is slow. Moisture is released slowly to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Silver Creek soils provide habitat for wildlife and areas for recreation.

Representative profile of Silver Creek silt loam in a cultivated field, 1,320 feet west and 100 feet north of the southeast corner of sec. 29, T. 14 N., R. 31 W.:

Ap1—0 to 5 inches, dark-gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak, medium and coarse, subangular blocky structure parting to weak, medium, prismatic; slightly hard, friable; violent effervescence (6 percent calcium carbonate); moderately alkaline; abrupt, smooth boundary.

Ap2—5 to 9 inches, dark-gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak, medium and coarse, subangular blocky structure parting to weak, medium, prismatic; slightly hard, friable; strong effervescence (8 percent calcium carbonate); moderately alkaline; clear, smooth boundary.

B21—9 to 18 inches, dark-gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak, medium and coarse, subangular blocky structure parting to moderate, medium, granular; slightly hard, friable; strong effervescence; moderately alkaline; clear, smooth boundary.

B22ca—18 to 28 inches, grayish-brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate, medium, prismatic structure parting to strong, medium, blocky; hard, very firm; dark stains on vertical faces of peds; lime concretions; slight effervescence; moderately alkaline; clear, smooth boundary.

B23ca—28 to 34 inches, light-gray (10YR 7/2) silty clay, grayish brown (10YR 5/2) moist, common, fine, distinct mottles, yellowish brown (10YR 5/6) moist; moderate, medium and coarse, subangular blocky structure; hard, firm; violent effervescence; moderately alkaline; clear, smooth boundary.

B3ca—34 to 39 inches, light brownish-gray (10YR 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common, fine, distinct mottles, yellowish brown (10YR 5/6) moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable; slight effervescence; moderately alkaline; clear, smooth boundary.

IIC1—39 to 46 inches, light brownish-gray (10YR 6/2) sand, grayish brown (10YR 5/2) moist; single grained; loose; moderately alkaline; clear, smooth boundary.

IIIC2—46 to 60 inches, very pale brown (10YR 7/3) sand and gravel, pale brown (10YR 6/3) moist; single grained; loose; moderately alkaline.

The A horizon is typically silt loam but in places is loam or silty clay loam. It is 9 to 16 inches thick. The B horizon ranges from 20 to 40 inches in thickness. The B2 horizon is silty clay loam or clay and is dark gray to grayish brown. The B3ca horizon is light gray to olive gray. Lime carbonate is at or near the surface. Many soft lime accumulations and lime concretions are between depths of 18 and 30 inches. In places, mixed sand and gravel is below a depth of 30 inches.

Silver Creek soils are associated in the landscape with Caruso, Cass, Humbarger, and Lawet soils. They have more clay between depths of 10 and 40 inches than these soils. They also have a higher water table than Caruso, Cass, or Humbarger soils and are better drained than Lawet soils.

Silver Creek silt loam (0 to 1 percent slopes) (Se).—This soil is on bottom lands of the Platte Valley in areas ranging from 5 to 200 acres in size. Its profile is the one described as representative of the Silver Creek series. In some areas the surface layer is loam or silty clay loam. In other areas it is a clay loam 12 to 28 inches thick. Mixed sand and gravel is at a depth of 30 inches in places.

Included with this soil in mapping were small areas of Caruso loam, the drained Lawet soils, and the saline-alkali phase of Silver Creek soils.

Runoff is slow. Wetness delays tillage and planting for a short time in spring. This soil warms up more slowly than better drained soils. The organic-matter content needs to be improved in order to increase the permeability and improve tilth, particularly where the surface layer is silty clay loam or clay loam. Maintaining fertility and proper water management are important concerns.

Most of the acreage of this soil is cultivated under irriga-

tion management. Corn, alfalfa, and grain sorghum are the principal crops. Capability units IIIw–2 dryland and IIIw–2 irrigated; Subirrigated range site; windbreak suitability group 2.

Silver Creek silt loam, saline-alkali (0 to 1 percent slopes) (Su).—This somewhat poorly drained claypan soil is on bottom lands in the Platte Valley. It occurs in areas ranging from 10 to 250 acres in size. Its profile is similar to the one described as representative of the Silver Creek series, except that the soil reaction is higher and soluble salts have accummulated in places. Small areas have a silty subsoil. About 10 percent of this soil is very strongly alkaline, about 50 percent is strongly alkaline, and about 40 percent is moderately alkaline.

Included with this soil in mapping were areas of Caruso loam. Also included were a few intermittent lakes that appear when above-normal rainfall causes the water table to rise above the floor of depressional areas.

Runoff is slow. High alkalinity and the accumulation of soluble salts are important limitations. Tilth is poor where the surface layer is very strongly alkaline, and nutrient deficiencies are common where the surface layer is strongly or very strongly alkaline. Lowering the alkalinity is not easily accomplished. The high reaction and firm consistence make this soil difficult to work. They also limit root growth and water movement. Because of the slow permeability and moderate available water capacity, this soil is droughty during late summer and fall when the water table is at its lowest level. Maintaining and balancing the fertility are important concerns of management.

About half of the acreage of this soil is cultivated under irrigation management. Alfalfa is the principal crop. Sugar beets have been grown on a small acreage in past years. Most of the remaining acreage is in native grass, but a few areas are in introduced grasses such as tall wheatgrass. Capability units IVs–1 dryland and IVs–2 irrigated; the strongly and very strongly alkaline part is in the Saline Subirrigated range site and the moderately alkaline part is in the Subirrigated range site; windbreak suitability group 8.

Slickspots

Slickspots are made up of nearly level, very poorly drained soil material in small, shallow depressions on bottom lands in the Platte Valley. The surface layer consists of 2 to 10 inches of strongly to very strongly alkaline silt loam, loam, or very fine sandy loam. Beneath this, the 12-inch subsoil is strongly to very strongly alkaline silt loam or silty clay loam. The underlying material is loam, moderately alkaline silt loam, silty clay loam, or very fine sandy loam. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late summer, the water table sometimes declines to a depth of about 6 feet.

In Lincoln County, Slickspots occur in an intricate pattern with Lawet soils. They are at slightly lower elevations than the Lawet soils and the subsoil is finer textured.

Runoff is very slow or ponded. The depressions generally hold rainwater until it evaporates. Slickspots are hard when dry and plastic when wet. Permeability is slow. Tilth is poor and the soil material is difficult to work. Where cultivated, Slickspots are light gray in color and are cloddy. Alkalinity is a severe hazard because it lessens the availability of certain plant nutrients. Crop stands are sparse and less well developed than in adjacent areas.

Most of the acreage of Slickspots is in native grass that is used for hay and pasture. Tall wheatgrass, alkali sacaton, inland salt grass, and other alkali-tolerant grasses can be grown, but trees are not suited. Slickspots are not assigned to any capability unit, range site, or windbreak suitability group.

Uly Series

The Uly series consists of deep, gently sloping to steep, well-drained soils. These soils are on the loess uplands and in the sand-loess transition areas.

In a representative profile the surface layer is friable, dark grayish-brown silt loam about 9 inches thick. Beneath this, the 6-inch subsoil is friable, grayish-brown silt loam. The underlying material is calcareous silt loam that is light gray to a depth of 23 inches and very pale brown to a depth of 60 inches.

Uly soils have moderate permeability and high available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to grass, trees, and shrubs. They provide habitat for wildlife and areas for recreation. The gently sloping and moderately sloping Uly soils are suited to cultivated crops under dryland or irrigation management.

Representative profile of Uly silt loam, 7 to 9 percent slopes, in native range, 1,160 feet north and 150 feet east of the southwest corner of sec. 16, T. 9 N., R. 26 W.:

A—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak, medium, prismatic structure parting to weak, medium, granular; slightly hard, friable; mildly alkaline; clear, smooth boundary.

B—9 to 15 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, prismatic structure parting to weak, medium, subangular blocky; hard, friable; many, dark worm casts; mildly alkaline; clear, smooth boundary.

C1—15 to 23 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable; dark material in old root channels; violent effervescence; moderately alkaline; gradual, smooth boundary.

C2—23 to 60 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak, medium, prismatic structure; slightly hard, friable; violent effervescence; moderately alkaline.

The A horizon is typically silt loam but in places is fine sandy loam. It is 7 to 10 inches thick and is grayish brown or dark grayish brown. The B horizon is 4 to 11 inches thick and is grayish brown, light brownish gray, or dark grayish brown. The C horizon is light gray to very pale brown. Depth to lime is from 10 to 20 inches.

Uly soils are associated in the landscape with Hord, Hobbs, Holdrege, Coly, and Hersh soils and with Rough broken land, loess. They have a thinner A horizon than Hord and Hobbs soils and a thinner B horizon than Hord and Holdrege soils. The B horizon is lacking in Coly and Hersh soils. Lime is at higher levels in Uly soils than in Holdrege and Hord soils and at lower levels than in Coly soils. Some of the steeper Uly soils are included in Rough broken land, loess.

Uly silt loam, 3 to 7 percent slopes, eroded (UaC2).—This soil is on slightly convex ridges on tablelands in the loess uplands and in the sand-loess transition areas. It also occupies parts of the broad ridges between canyon areas. This soil occurs in irregularly shaped areas ranging from 10 to 500 acres in size. Its profile is similar to the one described as representative of the Uly series, except that the surface layer is eroded and thinner and lime is nearer the surface. In a few areas, the surface layer is very fine sandy loam.

Included with this soil in mapping were small areas of Hersh fine sandy loam and Coly silt loam.

Runoff is medium. Erosion by water is the principal hazard. Where the surface is unprotected, soil blowing is a hazard. This soil is easily worked, but short, irregular slopes in most areas make conservation practices difficult. Maintaining a high level of fertility is an important concern of management.

Most of the acreage of this soil is cultivated, but a few areas have been reseeded to native grass. Corn, wheat, grain sorghum, and alfalfa are the principal crops. Capability units IIIe–1 dryland and IIIe–6 irrigated; Silty range site; windbreak suitability group 4.

Uly silt loam, 7 to 9 percent slopes (UaD).—This silty soil is on hillsides adjacent to intermittent drainageways and on narrow divides in the loess uplands. It occurs in areas ranging from 10 to 100 acres in size. The profile of this soil is the one described as representative of the Uly series.

Included with this soil in mapping were small areas of the moderately sloping Holdrege silt loam and the moderately steep Uly silt loam.

Runoff is medium. Erosion by water is a severe hazard where this soil is cultivated. The soil is easily worked.

Most of the acreage of this soil is in native grass that is used for grazing. The grass consists mainly of short, midsized types. Capability units IVe–1 dryland and IVe–6 irrigated; Silty range site; windbreak suitability group 4.

Uly-Coly silt loams, 7 to 9 percent slopes (UcD).—This complex borders drainageways in the loess uplands and in the sand-loess transition areas. It also is on narrow ridges between deeply dissected canyons. It occurs in irregularly shaped areas ranging from 10 to 120 acres in size. About 60 percent of the complex is Uly silt loam, which occupies the concave parts of the landscape; about 25 percent is Coly silt loam, on ridgetops; and the remaining 15 percent consists of Holdrege silt loam and other minor soils. Each of the soils in this complex has a profile similar to the one described as representative of its respective series, except that the surface layer is thinner and lighter colored.

Included with this complex in mapping were small areas of sandy material that is exposed at the surface. These areas are indicated on the detailed soil map by special spot symbols.

Runoff is medium. Where these soils are cultivated, erosion by water is the principal hazard. These soils are easily tilled, but in places erosion has resulted in gullies that are difficult to cross with farm machinery. Conserving water is a primary concern of management. Maintaining high fertility and organic-matter content are further concerns.

Most of the acreage of this complex is cultivated under dryland conditions. Wheat, corn, grain sorghum, and alfalfa are the principal crops. A few areas have been reseeded to native grass or to tame grass. Capability units IVe–1 dryland and IVe–6 irrigated; the Uly soil is in the Silty range site and the Coly soil is in the Limy Upland range site; the Uly soil is in windbreak suitability group 4 and the Coly soil is in windbreak suitability group 5.

Uly and Coly silt loams, 9 to 20 percent slopes (UeE).—These soils are on narrow divides between deeply entrenched drainageways and on hillsides bordering intermittent drainageways in the loess uplands and in the sand-loess transition areas. They occur in irregularly shaped areas ranging from 30 to 1,500 acres in size. Most of these areas contain both of the principal soils in this mapping unit, but Uly silt loam is predominant in concave areas and Coly silt loam is mostly on the ridges. In a few areas the Coly soil is not present. The profile of each of these soils is similar to the one described as representative of its respective series, except that lime is slightly nearer to the surface in the Uly soil.

Included with these soils in mapping were small areas of Holdrege silt loam and Hersh fine sandy loam. Also included were small areas of very steeply sloping Rough broken land, loess. Areas of Hobbs silt loam occur in narrow bottom lands, and limy sandstone is exposed in valley sides along some of the major drainageways.

Runoff is rapid. Only a small part of the rainfall penetrates the surface of the soil. Where vegetation is sparse, erosion by water is a severe hazard, but rangeland is furnished good protection by the cover of native grasses.

Nearly all of the acreage of this mapping unit is in native grass that is used for grazing. Small areas on the narrow flood plains are cultivated. Forage sorghum and alfalfa are the principal crops. Capability unit VIe–1 dryland; the Uly soil is in the Silty range site and the Coly soil is in the Limy Upland range site; the Uly soil is in windbreak suitability group 4 and the Coly soil is in windbreak suitability group 10.

Valentine Series

The Valentine series consists of deep, excessively drained, nearly level to very steep soils in the sandhills. These soils formed primarily on hummocks, hills, and dunes of eolian sand. In places they are adjacent to the Platte Valley and to other major valleys in the county.

In a representative profile the surface layer is loose fine sand that is grayish brown in the upper 2 inches and light brownish gray in the lower 4 inches. Beneath this, the underlying material is pale brown fine sand to a depth of 14 inches and very pale brown fine sand to a depth of 60 inches (fig. 15).

Valentine soils have rapid permeability, low available water capacity, low organic-matter content, and low natural fertility.

These soils are suited to grass and trees. They provide habitat for grassland wildlife and areas for recreation. Where they are not too steep or too coarse, Valentine soils are suited to cultivated crops under dryland or irrigation management.

Representative profile of Valentine fine sand, rolling, in native range, 1,320 feet north and 950 feet east of the southwest corner of sec. 7, T. 15 N., R. 30 W.:

A11—0 to 2 inches, grayish-brown (10YR 5/2) fine sand, very dark grayish brown (10YR 3/2) moist; single grained; loose; neutral; abrupt, smooth boundary.

A12—2 to 6 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) moist; single grained; loose; neutral; clear, smooth boundary.

C1—6 to 14 inches, pale-brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grained; loose; mildly alkaline; clear, smooth boundary.

C2—14 to 60 inches, very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose; mildly alkaline.

The A horizon is loamy fine sand or fine sand. It is 1 to 7 inches thick and is dark grayish brown or light brownish gray. The C horizon is brown to very pale brown loamy fine sand or fine sand.

Valentine soils are associated with Anselmo, Hersh, and Dunday soils in the uplands and with Elsmere soils in the Platte Valley. They have more sand in the C horizon than Anselmo or Hersh soils. Valentine soils have a thinner A horizon than Dunday soils. Depth to the water table is more than 10 feet in Valentine soils and is between 2 and 5 feet in Elsmere soils.

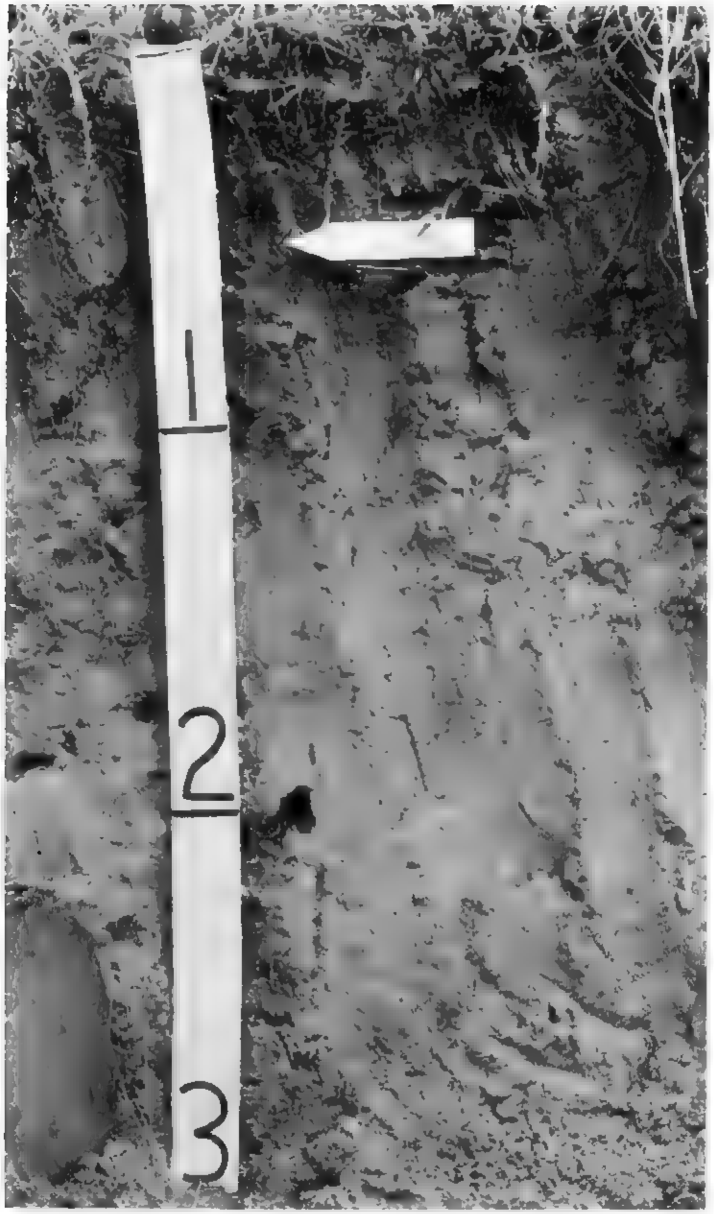

Figure 15.—**Profile of Valentine loamy fine sand, a deep, coarse-textured soil having a thin surface layer.**

Valentine fine sand, rolling (3 to 15 percent slopes) (VaE).—This sandy, gently undulating to rolling soil occurs in the sandhills in areas ranging from 80 to several thousand acres in size. In other parts of the county, this soil occupies areas ranging from 5 to 100 acres in size. The profile of this soil is the one described as representative of the Valentine series.

Included with this soil in mapping were large areas of Valentine loamy fine sand in the sandhills south of the Platte River and large areas of eroded and winnowed Valentine soils that formerly were cultivated. These latter soils have a thinner, lighter colored surface layer than that described in the representative profile. Small areas of the hilly Valentine complex are at higher elevations. Also included were areas of Dunday, Anselmo, and Hersh soils at lower elevations. Numerous small blowouts, shown on the detailed soil map by a special spot symbol, occur in areas of this rolling Valentine fine sand.

Runoff is very slow. Soil blowing is a very serious hazard. During most years the soil is droughty late in summer because of the low available water capacity. This soil is not suited to the common cultivated crops. Maintaining a dense cover of desirable grasses is a primary concern of management.

Nearly all of the acreage of this soil is in native grass that is used for grazing. Many areas that formerly were cultivated have been reseeded to native grass or have been allowed to revegetate naturally. Some such areas now have a good cover of little bluestem, but others produce only a sparse cover of panic grass, annuals, and six-week fescue. A few gently undulating areas are cultivated but, without irrigation, they produce only poor stands of corn, rye, and alfalfa. Capability unit VIe–5 dryland; Sands range site; windbreak suitability group 7.

Valentine loamy fine sand, nearly level (0 to 2 percent slopes) (VbB).—This soil occupies valleys in the sandhills and occurs on foot slopes between the sandy uplands and stream terraces. Areas of this soil range from 10 to 150 acres in size. The profile of this soil is similar to the one described as representative of the Valentine series, except the surface layer is loamy fine sand. In some areas the surface layer is fine sand and in places the underlying material is fine sandy loam. The surface layer is 10 to 12 inches thick in small areas.

Runoff is very slow. When the surface layer is dry, this soil is loose and difficult to work. Soil blowing is a serious hazard. Late in summer the soil tends to be droughty because of the low available water capacity. Maintaining a cover of desirable grasses on formerly cultivated areas is an important concern of management.

Most of the acreage of this soil is in native grass and is used as range. A few areas are mowed and used as hayland. Mixed stands of annual woods and native grasses have vegetated many areas that formerly were cultivated. A small acreage is cultivated. Corn, alfalfa, and rye are grown under dryland conditions, but crop response generally is poor. Alfalfa and tame grasses are grown under irrigation management. Capability units IVe–5 dryland and IVe–11 irrigated; Sandy range site; windbreak suitability group 3.

Valentine loamy fine sand, rolling (3 to 15 percent slopes) (VbE).—This sandy soil occupies smooth hills and foot slopes in the sandhills and in sand-loess transition areas on the uplands. It occurs in areas ranging from 20 to 600 acres in size. The profile of this soil is similar to the one described as representative of the Valentine series, except that the surface layer is loamy fine sand.

Included with this soil in mapping were areas of Dunday loamy fine sand and small areas of Anselmo fine sandy loam. Most of these are in low, concave areas.

Runoff is very slow because most of the rainfall is absorbed by the soil. Soil blowing is a very severe hazard. Where overgrazing is permitted, small blowouts form and the blown-out sand sometimes covers and damages adjacent grassland. This soil is droughty because of its low available water capacity. Maintaining good to excellent range condition is an important concern of management.

Most of the acreage of this soil is in native grass that is used for grazing or hay. Capability unit VIe–5 dryland; Sands range site; windbreak suitability group 7.

Valentine complex, hilly (3 to 60 percent slopes) (VcF).—This soil complex occupies sandhills north and south of the Platte Valley. It occurs in areas ranging from 30 to several thousand acres in size. About 60 percent of the complex is Valentine fine sand, rolling, and 40 percent is Valentine fine sand, hilly. The rolling Valentine soils are at the lower elevations. Hilly Valentine soils, at higher elevations, occupy long ridges that generally are oriented northwest to southeast. A few areas of steep to very steep Valentine soils are in bordering loess areas where deeply dissected canyons and drainageways are mantled with sand. The profile of each of the soils in this complex is similar to the one described as representative of the Valentine series, except that the surface layer is thinner on the hilly part of the complex.

Included with these soils in mapping were small areas of Uly, Anselmo, Dunday, and Hersh soils.

Runoff is very slow. Soil blowing is a very severe hazard. Small blowouts form readily in overgrazed areas and in other places where the thin surface layer is not protected.

All of the acreage of this complex is in range. Most areas have good stands of grass. Capability unit VIIe–5 dryland; the rolling part is in the Sands range site and the hilly part is in the Choppy Sands range site; windbreak suitability group 10.

Vetal Series

The Vetal series consists of deep, well-drained, nearly level to very gently sloping soils. These soils formed in mixed loamy materials that were deposited by wind and locally influenced by water. They occur mainly on foot slopes and in swales and basins in sand-loess transition areas of the uplands.

In a representative profile the surface layer is friable fine sandy loam that is dark grayish brown to very dark grayish brown in the upper 16 inches, dark grayish brown in the middle 6 inches, and dark brown in the lower 8 inches. Beneath this is a 16-inch transition layer of friable, grayish-brown fine sandy loam. The underlying material is grayish-brown loam to a depth of 54 inches. Below this is a buried soil of dark grayish-brown light silty clay loam to a depth of 60 inches.

Vetal soils have moderately rapid permeability and high available water capacity. These soils have moderate organic-matter content and high natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass, trees, and shrubs. Vetal soils provide habitat for rangeland wildlife and areas for recreation.

Representative profile of Vetal fine sandy loam, loamy substratum, 0 to 3 percent slopes, in a cultivated field, 1,056 feet west and 2,059 feet south of the northeast corner of sec. 20, T. 10 N., R. 32 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, medium, granular; soft, friable; neutral; abrupt, smooth boundary.

A12—6 to 16 inches, very dark grayish-brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak, medium, granular structure; soft, friable; neutral; clear, smooth boundary.

A13—16 to 22 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, medium, granular; slightly-hard, friable; mildly alkaline; clear, smooth boundary.

A14—22 to 30 inches, dark-brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable; mildly alkaline; clear, smooth boundary.

AC—30 to 46 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, medium, prismatic structure; slightly hard, friable; small root channels and worm casts; mildly alkaline; clear, smooth boundary.

C—46 to 54 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; mildly alkaline; abrupt, smooth boundary.

Ab—54 to 60 inches, dark grayish-brown (10YR 4/2) light silty clay loam, very dark grayish brown (10YR 3/2) moist; massive; hard, firm; mildly alkaline.

The A horizon is typically fine sandy loam but in places is sandy loam. It is 10 to 36 inches thick and is dark brown, dark grayish brown, or grayish brown. The AC horizon, 12 to 24 inches thick, is grayish-brown to light brownish-gray fine sandy loam or loamy fine sand. In places both the AC and C horizons are silty. The C horizon is stratified in some areas. Lime carbonate generally is lacking but is present in the C horizon in places where Vetal soils are near deposits of loess.

Vetal soils are associated in the landscape with Hersh, Dunday, Valentine, and Hord soils. They have a thicker A horizon than Hersh, Dunday, or Valentine soils. Vetal soils contain less sand throughout their profiles than Dunday or Valentine soils, and they contain less sand between depths of 10 and 40 inches than Hord soils. They contain more sand between depths of 10 to 40 inches than Hord soils.

Vetal fine sandy loam, loamy substratum, 0 to 3 percent slopes (VeB).—This loamy soil is in shallow basins and swales and on foot slopes in the sand-loess transition areas of the uplands. It occurs in areas ranging from 5 to 80 acres in size. The loamy substratum typically occurs below a depth of 40 inches and is mainly loam or silty clay loam. In places the surface soil is only 10 to 20 inches thick. Small areas have a silty subsoil, and some areas have a stratified, silty underlying material.

Included with this soil in mapping were areas of soils that have a loamy fine sand surface layer and some areas where the underlying material is silty.

Runoff is slow. After rains, ponding occurs in some low places but lasts for only a short time and generally is beneficial. Soil blowing is the principal hazard. This is one of the best soils for growing crops in the sand-loess transition areas. The loamy substratum holds moisture in the rooting zone of plants and keeps the soil from being droughty.

Much of the acreage of this soil is dryfarmed. Wheat, corn, and grain sorghum are the principal crops. Some corn is irrigated. A few areas are in native grass that is used for grazing. Capability units IIe–3 dryland and IIe–8 irrigated; Sandy range site; windbreak suitability group 3.

Wann Series

The Wann series consists of deep, nearly level, somewhat poorly drained soils on bottom lands in the Platte Valley. These soils formed in stratified loamy and sandy alluvium. Depth to the seasonal high water table ranges from about 2 feet in wet years to about 4 feet in dry years. During the driest part of the year, generally late summer, the water table sometimes lowers to a depth of about 5 feet.

In a representative profile the surface layer is very friable fine sandy loam that is dark gray in the upper 8 inches and gray in the lower 6 inches. The underlying material is stratified very pale brown and pale brown fine sandy loam

to a depth of 34 inches. Beneath this, a buried soil of dark-gray fine sandy loam extends to a depth of 60 inches. Wann soils are calcareous throughout the profile.

Wann soils have moderately rapid permeability and high available water capacity. These soils have moderately low organic-matter content and medium natural fertility. They absorb moisture easily and release it readily to plants.

These soils are suited to cultivated crops under dryland or irrigation management. They also are suited to grass and to trees and shrubs in windbreaks. Wann soils provide habitat for wildlife and areas for recreation.

Representative profile of Wann fine sandy loam in native range, 2,534 feet south and 200 feet west of the northeast corner of sec. 34, T. 12 N., R. 26 W.:

A11—0 to 8 inches, dark-gray (10YR 4/1) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable; violent effervescence; moderately alkaline; gradual, smooth boundary.

A12—8 to 14 inches, gray (10YR 5/1) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, subangular blocky structure parting to weak, fine, granular; soft, very friable; violent effervescence; moderately alkaline; diffuse, smooth boundary.

C—14 to 34 inches, stratified very pale brown (10YR 7/3) and pale-brown (10YR 6/3) fine sandy loam, light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) moist; few, fine, distinct mottles, reddish brown (5YR 4/4) moist; massive; soft, loose; strong effervescence; moderately alkaline; gradual, smooth boundary.

Ab—34 to 60 inches, dark-gray (10YR 4/1) fine sandy loam, very dark gray (10YR 3/1) moist; massive; soft, very friable; violent effervescence; moderately alkaline.

The A horizon is typically loam and fine sandy loam but in places is loamy fine sand. It is 7 to 18 inches thick and is grayish brown to very dark gray. The C horizon is dark gray to very pale brown and though silty in some areas is typically fine sandy loam or loamy fine sand. Distinct mottles are common below a depth of 10 inches. The A horizon is moderately to very strongly alkaline in some areas. Mixed sand and gravel is below a depth of 40 inches in places.

Wann soils are associated in the landscape with Lawet, Elsmere, Platte, Alda, and Cass soils and with Wet alluvial land. They have a coarser C horizon than Lawet soils and a less coarse textured C horizon than Elsmere soils. Wann soils are deeper than Platte soils, which are shallow over mixed sand and gravel, and deeper than Alda soils, which are moderately deep over sand and gravel. They have a higher water table than Cass soils and a lower water table than Wet alluvial land.

Wann fine sandy loam (0 to 1 percent slopes) (Wb).—This soil is on bottom lands in the North Platte River valley and in the South Platte River valley. It occurs in generally elongated areas ranging from 10 to 30 acres in size. The profile of this soil is the one described as representative of the Wann series.

Included with this soil in mapping were small areas of Platte-Alda soils, Elsmere loamy fine sand, Lawet silt loam, and the drained Lawet fine sandy loam.

Runoff is slow. Wetness, the principal limitation, causes the soil to warm up slowly in the spring and thus delays tillage and planting. Where the surface is not protected, soil blowing is a hazard. Phosphorus commonly is deficient. Improving the organic-matter content and maintaining the fertility are concerns of management.

About one-half of the acreage of this soil is cultivated and the other half is in native grass that is used for grazing or haying. Alfalfa and corn are the principal irrigated crops. Milo and alfalfa are dryfarmed. Capability units IIw–6 dryland and IIw–8 irrigated; Subirrigated range site; windbreak suitability group 2.

Wann fine sandy loam, saline-alkali (0 to 1 percent slopes) (Wf).—This soil occurs on bottom lands in the Platte Valley. It occupies low areas ranging from 5 to 80 acres in size. About 20 percent of this soil is very strongly alkaline, about 45 percent is strongly alkaline, and the remaining 35 percent is moderately alkaline or has a moderate accumulation of soluble salts. A white salt crust occurs at the surface in many places when moisture evaporates. The profile of this soil is similar to the one described as representative of the Wann series, except that the surface layer has higher salinity and is more strongly alkaline. The underlying material is silty in places.

Included with this soil in mapping were small areas of Elsmere loamy fine sand at slightly higher elevations and Wet alluvial land at lower elevations.

Runoff is slow. Heavy rains cause occasional flooding. Wetness prevents the soil from warming up early in spring and thus delays tillage and planting. The saline-alkali condition is the principal limitation. High alkalinity results in poor tilth and the soil is difficult to work. Soil blowing is a hazard where the surface is unprotected. Applications of nitrogen, phosphorus, zinc, and iron commonly are needed for sustained crop production. Improving and maintaining fertility and obtaining internal drainage are important concerns of management.

Most of the acreage of this soil is in native grass that is used for grazing and hay. A small acreage is cultivated and most of this is irrigated. Alfalfa, tame grass, sugarbeets, milo, and corn are the principal crops. Capability units IVs–1 dryland and IIIs–8 irrigated; the strongly and very strongly alkaline part is in the Saline Subirrigated range site and the moderately alkaline part is in the Subirrigated range site; windbreak suitability group 8.

Wann loam (0 to 1 percent slopes) (Wm).—This soil is on bottom lands of the Platte Valley. It occurs in areas ranging from 10 to 200 acres in size. Its profile is similar to the one described as representative of the Wann series, except that the surface layer is loam.

Included with this soil in mapping were small areas of Wann fine sandy loam and Alda soils. Also included were small areas that have loam, silty clay loam, or silty clay between depths of 24 and 40 inches.

Runoff is slow. Wetness is the principal limitation. This soil warms up slow early in spring, and tillage and planting are delayed longer than in areas of better drained soils. Soil blowing is a hazard, particularly early in fall when the surface of the soil is dry and crops have been harvested. Excess lime in the surface layer makes much of the soil phosphorus unavailable to plants. Applications of phosphate, nitrogen, zinc, and iron commonly are needed. Improving and maintaining fertility are concerns of management.

About half of the acreage of this soil is in native grass and the remainder is cultivated. Alfalfa is the principal dryland crop and corn and alfalfa are the principal irrigated crops. Capability units IIw–4 dryland and IIw–8 irrigated; Subirrigated range site; windbreak suitability group 2.

Wet Alluvial Land

Wet alluvial land (0 to 1 percent slopes) (Wx) consists of nearly level, very poorly drained, loamy and silty soil material on bottom lands in the Platte Valley and along Medicine Creek. It occurs in depressions ranging from 20 to 300 acres in size.

The surface layer is thick and ranges from fine sandy loam to mucky silty clay loam in texture. Beneath this, the underlying material is loam and sandy loam in the upper part and light gray to gray sand in the lower part. Water is ponded on the surface for short periods of time. The water table fluctuates between the surface and a depth of 28 inches.

Included with this soil material in mapping were small areas of Lawet silt loam and Marsh.

Wet alluvial land has moderate permeability and high available water capacity. Excessive wetness is a severe hazard and drainage is lacking. This soil material is not suited to cultivated crops.

All of the acreage of Wet alluvial land is in native grass that is used for grazing and hay. The vegetation consists primarily of prairie cordgrass, reed grasses, and other plants that tolerate excessive wetness. Capability unit Vw-7 dryland; Wet Land range site; windbreak suitability group 10.

Use and Management of the Soils

This section provides information on the use and capabilities of the soils in Lincoln County. A general discussion of management practices for dryland and irrigated crops is followed by an explanation of the capability classification used by the Soil Conservation Service and a grouping of the soils into units according to that classification. Management of rangeland is discussed and the soils are grouped into range sites, each of which is a distinctive type of rangeland. Information is presented on native woodland, on the suitability of the soils in the county for windbreaks, and on the species of trees suited to each soil. The wildlife and habitat for wildlife are described for each of the soil associations. Recreational potentials are discussed and evaluated. The section concludes with a description of the engineering properties of the soils, interpretations of engineering test data for each of the soil series, and a discussion of the importance of each soil for engineering purposes.

Management of the Soils for Crops and Pasture[2]

The arable soils in Lincoln County generally are fertile and, under proper management, are well suited to crops. Most of these soils are capable of producing good yields of the major crops grown in the area. They generally are cultivated, but part of the acreage each year remains idle and commonly is diverted to government control programs.

Much of the nonarable land in the county is in native range, which, with the irrigated pasture land, provides most of the grazing for cattle. The remainder provides habitat for wildlife or is used for recreational purposes. Approximately 53 percent of the soils in Lincoln County are in sandhills areas; these generally are not suited to crops but provide large areas of native range. About 17 percent of the soils in the county have slopes of more than 10 percent and are too steep to be cultivated. Some areas of the moderately sloping Anselmo soils and the Uly-Coly silt loams formerly were cultivated but now are in grass and are used for pasture, range, or hay production. Erosion by water has occurred in many places on the uplands. Severely eroded land is not suited to cultivation. During the growing season, erosion on the uplands is a threat to valley-land crops that are subject to silt deposition resulting from the erosion. Some areas in the sandhills that formerly were cultivated are being eroded because the grass cover is not yet sufficient to control soil blowing.

[2] By Ervin O. Peterson, conservation agronomist, Soil Conservation Service.

The principal concerns of soil management in Lincoln County are controlling erosion from water and soil blowing, maintaining soil moisture, and maintaining and increasing the organic-matter content of the soil. Excessive wetness and saline and alkaline conditions are hazards on some bottom-land soils. The potential exists for a greater use of conservation practices, particularly on the gently sloping and moderately sloping soils. Where a suitable quantity of ground water is available and where the soil is not too steep or too sandy, a potential also exists for increasing the acreage of irrigated cropland and pasture.

Managing dryland soils

Winter wheat is the major crop cultivated under dryland conditions. Next in importance are corn and alfalfa, both of which are grown mostly on Cozad, Hall, Hobbs, and Hord soils. Small amounts of barley and sorghum are grown. A minor acreage is occupied by dryland pastures, which generally are located in small lots near farmsteads and building sites. These pastures commonly are planted to cool-season grasses and are grazed during the spring and fall months.

On dryfarmed soils in Lincoln County, crop residue should be left on the surface of the soil during tillage operations to reduce soil losses from erosion by water and soil blowing. Straw, stalks, and other plant residue should be retained during summer fallow operations to reduce soil blowing. Mulch tillage and till-plant systems of seedbed preparation are good management tools to reduce runoff and sediment losses on soils planted to row crops. Grasses in pasture and range need a growth of at least 4 inches at all times to protect the steeper soils against erosion by water and the sandy soils against soil blowing.

Terracing, contour farming, and using a cropping system that includes mulch tillage are conservation practices suited to gently sloping and moderately sloping soils, such as those in the Holdrege and Uly series. Flat channel terraces are particularly well adapted to conserving soil moisture on some gently sloping soils where wheat is the principal crop. These terraces generally are about 50 to 80 feet wide and are constructed to retain runoff from higher elevations. The runoff spreads over the entire channel and generally results in higher production of crops.

On some of the sandier soils, such as those in the Anselmo and Hersh series, soil blowing can be controlled adequately by using a mulch of crop residue on the surface, by arranging fields in narrow strips of alternately protected and unprotected areas, or, in some places, by using narrow belts of trees for field windbreaks.

Soils in depressions, such as Scott soils, need to be protected from runoff from surrounding areas. Terraces and diversions can be used on adjacent higher elevations to retain rainfall and prevent it from inundating the depressional areas. In wet soils, such as those in the Wann, Lawet, and Elsmere series, open drainage ditches and tile systems can be used to help lower the water table if suitable outlets are available for disposal of the water at lower elevations.

Saline-alkali soils can be dryfarmed by growing crops and

grasses that are tolerant to alkalinity and salinity. Grain sorghum, barley, and wheat are crops suited to these soils, and tall wheatgrass, western wheatgrass, and switchgrass are suitable grasses. Saline and alkali problems can be controlled best by installing a drainage system to lower the water table and by irrigating with surface water to wash or leach the salts and alkali from the rooting zone of plants. Proper drainage can remove some of the salts from the soil and is necessary to prevent a further increase of alkali and salts.

Soils to be cultivated should be tested to determine their need for commercial fertilizers. The amount of fertilizer to be applied to dryfarmed crops depends on the amount of moisture in the soil. Less fertilizer should be applied during periods of low rainfall when the subsoil is dry than during periods of normal or above-average rainfall when the subsoil contains more moisture. If planted on fallow land where extra moisture is stored, winter wheat responds well to a light application of nitrogen. Phosphorus and zinc generally are needed on eroded Holdrege and Uly soils.

Managing irrigated soils

Corn is the principal irrigated crop in Lincoln County; it is grown on about one-half of the irrigated acreage. Next in importance are alfalfa, grain sorghum, and forage sorghum. Smaller amounts of sugarbeets, potatoes, oats, wheat, dry beans, and pasture grasses are grown. Most of the irrigated acreage is located in the valleys of the North Platte, South Platte, and Platte Rivers. A smaller acreage is on the uplands where suitable soils are located and where irrigation water is available. In 1972, according to the Nebraska Agricultural Statistics Report, 109,800 acres were irrigated with water from 776 irrigation wells and from surface water diverted from streams. The surface water used for irrigation is supplied by canals owned and operated by irrigation companies.

Soils that are level or gently sloping are best suited to irrigation. If slopes are more than 8 percent, irrigation causes severe erosion and excessive runoff results in a loss of irrigation water. Both row crops and close sown crops are well suited to irrigation, but row crops sometimes need to be replaced by close sown crops. A change from corn to alfalfa helps to control the cycle of disease and insects that are commonly present when the same crop is grown year after year on the same soil. Very gently sloping soils, such as Anselmo fine sandy loam, 0 to 3 percent slopes, and Holdrege silt loam, 1 to 3 percent slopes, are subject to erosion by water where row crops are planted up and down the hill. Such soils are best suited to a cropping sequence that includes several years of row crops followed by 3 to 5 years of close grown crops, such as alfalfa or a mixture of alfalfa and grass, that can be used for hay or pasture. Gently sloping soils, such as Uly silt loam, 3 to 7 percent slopes, eroded, and Hersh soils, 3 to 5 percent slopes, are better suited to irrigation of close sown crops than to row crops.

On nearly level or gently sloping soils, the irrigation method commonly is determined by the type of crop to be irrigated. In Lincoln County, the furrow method generally is used for irrigating row crops on slightly sloping soils. In this method, the water is introduced into furrows between the plant rows by gated pipe or siphon tubes and is carried down the row by gravity. Where the slope of the furrow is 1.5 percent or more, soil erosion is likely to be excessive and other irrigation systems need to be considered. Border irrigation commonly is used to irrigate close sown crops on soils that are nearly level or very gently sloping. In this method, flooding is controlled by borders or small dikes along the sides of narrow strips in the field. Irrigation water flows as a thin uniform sheet and is absorbed by the soil as the flow advances across the strip. The strips need to be leveled and should be of uniform grade. Border irrigation is well suited to soils like Hord silt loam, 0 to 1 percent slopes, and Holdrege silt loam, 1 to 3 percent slopes.

Sprinkler irrigation systems are used on the more sloping soils and also can be used on the nearly level or gently sloping soils. Most soils on the uplands are irrigated by sprinklers, and soils such as Anselmo fine sandy loam, 3 to 5 percent slopes, are well suited to irrigation by this method. Sprinklers are well adapted to the irrigation of sandy soils where the intake rate is so high that a furrow system is not practical. These irrigation systems use a series of small sprinklers spaced along distribution pipes. They are of two general types. One type operates in sets—that is, the distribution pipes are set at certain locations and operate at those locations until a specified amount of water is applied. The other is a series of sprinklers along a pipe that revolves around a central pivot. Such sprinkler systems are especially useful for establishing new pastures on moderately steep slopes and for irrigating soils on sandy or steep slopes where other systems are not suitable for use. In summer, wind shift and water lost through evaporation can cause an uneven application of water from some sprinkler systems.

Irrigation water should be applied frequently enough to keep the root zone moist during the growing season. The interval between applications should vary according to the crop and the time of year. Water should be applied only as fast as the soil can absorb it, and the amount applied should not exceed the moisture-holding capacity of the soil. The deep soils in Lincoln County, such as Cozad silt loam, 0 to 1 percent slopes, hold about 2 inches of water per foot of soil depth. Thus, a soil that is 4 feet deep can hold about 8 inches of water, which would be available to a crop that extends its roots to that depth. The best efficiency is obtained if irrigation is begun at the time when the soil contains about one-half the amount of water that it is capable of holding in storage. Hence, if a soil can hold 8 inches of available water, irrigation generally should be started when the soil contains about 4 inches of water. It can be continued until the maximum available water capacity is reached and thereafter should replace the water used by the crop.

Proper management of irrigation systems consists of regulating the application of water in such a way that good crop growth is obtained without eroding the soil or wasting water. Terracing, contour farming, mulch tillage, and leaving crop residue on the surface of the soil are important management practices for controlling erosion and runoff where sloping soils are irrigated. In places, runoff can be collected in a pit and reused as irrigation water. Assistance in the planning and layout of irrigation systems is available from the local office of the Soil Conservation Service or from the county agricultural agent. Estimates concerning the cost of equipment can be obtained from local irrigation equipment dealers and manufacturers.

Irrigated crops generally have higher yields than dryfarmed crops. Because they remove more nitrogen, phosphorus, and other plant nutrients from the soil, supplies of plant nutrients need to be restored by returning crop residue to the soil and by adding manure and commercial fertilizers. Most irrigated crops in Lincoln County respond to nitrogen. Crops on soils

disturbed during land leveling, particularly where topsoil has been removed, generally also respond to applications of phosphorus, zinc, and iron. The kinds and amounts of fertilizer needed for specific irrigated crops can be determined by soil tests.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or to other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering uses.

In the capability system, the kinds of soil are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, wildlife, or recreation.
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, wildlife, or recreation.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, wildlife, or recreation.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry. In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, or *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIe-6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Because dryfarmed soils and irrigated soils require different management practices, the capability units for Lincoln County have been classified further by adding either the word "dryland" or the word "irrigated" after the symbol for the capability unit, for example, IIe-1 dryland or IIIe-6 irrigated. Each soil or land type in the county is assigned to a dryland capability group and, if suited to irrigation, it is assigned also to an irrigation capability group. The names of all soils and land types in any capability unit in the county can be found in the "Guide to Mapping Units" at the back of this survey.

Management by dryland capability units

Each of the capability units for growing crops under a dryland system of management is discussed on the following pages. Common features of the soils in each unit are described and properties useful to management are given. Crops suited to this kind of management are listed and the hazards and limitations are described together with practices that help to overcome them.

CAPABILITY UNIT I-1 DRYLAND

This unit consists of deep, nearly level soils on bottom lands in valleys of the North Platte, South Platte, and Platte Rivers and of Wildhorse Creek. These soils are moderately well drained. They have a medium-textured surface layer and a medium-textured to moderately coarse textured transition layer. The upper part of the underlying material is medium textured to moderately coarse textured, and the lower part is coarse textured. Reaction in the surface layer is mildly alkaline. The water table is at a depth of 4 to 15 feet.

Soils in this unit have moderate permeability and moderate available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Improving the organic-matter content and maintaining the high fertility are the principal concerns of management. Soil blowing can be a hazard where the surface is not protected.

These soils are some of the best in Lincoln County for growing cultivated crops. They are well suited to corn, sorghum, alfalfa, wheat, and grass. Soils in this unit can be cultivated intensively without the use of special practices for control of runoff or erosion. Shallow ground water generally provides moisture to deep-rooted crops during periods of prolonged lack of rainfall. Ordinary good cropping practices are needed, including the periodic use of legumes and green manure crops for maintaining fertility and good soil structure. Crops in these soils respond well to commercial fertilizers.

CAPABILITY UNIT IIe-1 DRYLAND

This unit consists of deep, well-drained, very gently sloping soils on uplands. These soils have a silt loam surface layer. Some have a medium-textured surface layer and others have a medium-textured or moderately fine textured subsoil. The underlying material is medium in texture. Reaction in the surface layer ranges from neutral to mildly alkaline.

Soils in this unit have moderate or moderately slow permeability and high available water capacity. Organic-matter content is moderate or moderately low and natural fertility is high or medium. Some of these soils are slightly eroded. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Maintaining the organic-matter content is a concern of management. Erosion by water and soil blowing are the principal hazards. During many years lack of sufficient moisture can limit crop production where these soils are dryfarmed.

A large acreage of the soils in this unit is on stream terraces. These terraces are mostly level and are drained by either V-shaped or flat channels. Level terraces that have flat channels distribute the rainwater better than those that have V-shaped or narrow channels. Deep-rooted crops, such as alfalfa, generally benefit from subirrigation on these low terraces.

These soils are suited to wheat, sorghum, corn, alfalfa, and grass, but wheat is the principal crop. Stripcropping, stubble-mulch tillage, and terracing help to conserve moisture, control erosion, and prevent soil blowing. Summer fallow commonly is used on these soils to store extra moisture for the following year's crop and to prevent serious soil blowing. Although nitrogen and phosphate fertilizers generally are not needed, tests can be made to determine whether applying these fertilizers would benefit crops.

CAPABILITY UNIT IIe-3 DRYLAND

This unit consists of deep, well-drained, nearly level to very gently sloping soils on high bottom lands, stream terraces, foot slopes, and uplands. These soils have a fine sandy loam or sandy loam surface layer. Some have a medium-textured or moderately coarse textured transition layer, and others have a subsoil that ranges from moderately fine textured to moderately coarse textured. The underlying material is moderately fine textured to moderately coarse textured. Reaction in the surface layer ranges from neutral to moderately alkaline.

Soils in this unit have moderate to moderately rapid permeability and moderate to high available water capacity. Organic-matter content is moderate or moderately low and natural fertility is medium or high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work, regardless of moisture conditions.

Erosion by water and soil blowing are the principal hazards. During many years lack of sufficient water limits production where these soils are dryfarmed. On the bottom lands, deep-rooted crops receive beneficial moisture from depths of 6 to 10 feet. Phosphorus is deficient in some areas.

These soils are suited to corn, grain sorghum, alfalfa, wheat, and grass. Corn and wheat are the principal crops. Stripcropping, cover crops, shelterbelts, and stubble-mulch tillage are needed to control erosion by water and soil blowing. A suitable cropping system consists of crops that provide a protective cover most of the year, especially during the fall and winter months. In some dryfarmed areas, these soils have lost most of their original organic matter and most of the fine soil particles. In such areas, adding stubble, stalks, and other crop residue to the soil helps to increase the supply of organic matter. Response of crops to nitrogen, phosphorus, and zinc is better where these soils are irrigated than where they are dryfarmed.

CAPABILITY UNIT IIw-3 DRYLAND

The only mapping unit in this capability unit is Hobbs and McCook silt loams. These are deep, moderately well drained, nearly level to very gently sloping soils on bottom lands. They are medium textured throughout the profile. Reaction in the surface layer is neutral to mildly alkaline.

These soils have moderate permeability and moderate to high available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow. These silt loams absorb moisture easily and release it readily to plants. They are easy to work.

Occasional flooding results in erosion, scouring, and formation of gullies. Where these soils are cultivated, wetness can delay tillage and planting in the spring. Slight flooding in dry seasons can be beneficial.

Sorghum, corn, alfalfa, and grass are the crops best suited to these soils. In some places diversions can be used to prevent floodwater from flowing over the fields. In others, upslope flood detention reservoirs can help to control excessive runoff.

CAPABILITY UNIT IIw-4 DRYLAND

This unit consists of deep, nearly level, somewhat poorly drained soils on bottom lands and low stream terraces. These soils have a loam or silt loam surface layer that is somewhat calcareous. The subsoil is medium textured, and the underlying material is medium to moderately coarse textured. Reaction in the surface layer is mildly alkaline to moderately alkaline. Depth to the water table ranges from 2 to 5 feet.

Soils in this unit have moderate or moderately rapid permeability and high available water capacity. Organic-matter content is moderately low and natural fertility is medium. Runoff is slow. These soils are easy to work.

Wetness causes these soils to warm slowly in the spring and delays tillage and planting. During dry years deep-rooted crops receive beneficial moisture by subirrigation. Soil blowing can be a hazard where the surface is not protected. Maintaining fertility is a concern of management.

These soils are suited to alfalfa, wheat, corn, sorghum, and grass. Alfalfa and corn are the principal crops. To protect the soil from blowing, crop residue can be left on the surface. Soil tests can be made and fertilizers containing appropriate amounts of phosphate, nitrogen, zinc, and iron can be applied to help maintain the fertility. Where suitable outlets

are available, tile or open-ditch drainage systems can be used to lower the water table.

CAPABILITY UNIT IIw-6 DRYLAND

Wann fine sandy loam is the only soil in this capability unit. This deep, nearly level, somewhat poorly drained soil is on bottom lands. It is moderately coarse textured and calcareous throughout the profile. Reaction in the surface layer is moderately alkaline. Depth to the water table fluctuates from about 2 feet in the spring to about 5 feet in the fall.

This soil has moderately rapid permeability and high available water capacity. Organic-matter content is moderately low and natural fertility is medium. Runoff is slow. This sandy loam absorbs moisture easily and releases it readily to plants. It is easy to work.

The moderately high water table causes this soil to warm slowly in the spring. During some years the soil is droughty late in summer when the water table generally is at its lowest level. Soil blowing is a hazard where the surface is unprotected. Phosphorus commonly is unavailable to plants. Maintaining fertility is a concern of management.

Alfalfa, small grain, sorghum, and corn are suited to this soil. Some areas are in native grass that is used for grazing or for hay. Row crops benefit from mulch planting, because the seed is placed in the ridge of the previous year's row rather than directly in the cool, wet soil. Also, the mulch protects the surface of the soil from blowing. Fertility can be maintained by using alfalfa in the cropping sequence and by adding phosphorus and other nutrients. Where suitable outlets are available, the water table can be lowered and stabilized by using tile or open V-ditches.

CAPABILITY UNIT IIc-1 DRYLAND

This unit consists of deep, nearly level to very gently sloping soils. These soils are well drained to moderately well drained and are on uplands, foot slopes, stream terraces, and high bottom lands. The surface layer is medium and moderately fine in texture. Some of these soils have a moderately fine textured transition layer. The others have a subsoil that is moderately fine textured or medium textured, except in a few places where it is moderately coarse textured. The underlying material is moderately fine to coarse in texture. Reaction in the surface layer is neutral to moderately alkaline.

Soils in this unit have moderate or moderately slow permeability, except in places where the underlying material has moderately rapid permeability. Available water capacity is moderate or high, organic-matter content is moderate or moderately low, and natural fertility is medium or high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easily worked.

Lack of rainfall is the main limitation where these soils are dryfarmed. On the low stream terraces and high bottom lands, deep-rooted crops obtain moisture by subirrigation. Soil blowing is a hazard where the surface is unprotected. Maintaining the organic-matter content and high fertility are the principal concerns of management.

These soils are some of the best in Lincoln County for growing cultivated crops. They are well suited to corn, grain sorghum, wheat, and other small grains. Crop residue needs to be added to these soils during tillage operations to conserve moisture and prevent soil blowing. A cropping system that includes a year of fallow conserves moisture and helps to maintain fertility. Wheat can be planted in soil that has been fallow the previous year or, if a longer cropping system is desired, a suitable sequence is one year each of fallow, wheat, and grain sorghum or another small grain. Stubble-mulch tillage during the fallow year is effective in conserving water, adding organic matter to the soil, and preventing soil blowing.

CAPABILITY UNIT IIIe-1 DRYLAND

This unit consists of deep, well-drained, gently sloping soils on uplands, foot slopes, and stream terraces. These soils have a silt loam surface layer. Some have a transition layer of very fine sandy loam. The others have a subsoil that generally is silt loam but in a few places is very fine sandy loam or silty clay loam. The underlying material is silt loam or very fine sandy loam. Some areas are eroded. Reaction in the surface layer is neutral or mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderately low or moderate and natural fertility is medium or high. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Rainfall commonly is inadequate for crop production. Conservation of water is an important concern of management. Erosion by water and soil blowing are the principal hazards.

These soils are suited to wheat, corn, sorghum, and grass. Under dryland conditions, row crops should not be planted more than 2 years in succession. In dry years, when crops fail, cover crops and emergency tillage can be used to protect the soil from blowing. Contour stripcropping, stubble-mulch tillage, terracing, and contour farming help to control erosion by water, although terracing and contour farming are not suited to some areas. Close-drilled grass and hay crops in the cropping system also help to control erosion by water. Leaving most of the crop residue on the surface after planting not only reduces erosion by water but also helps to prevent soil blowing.

CAPABILITY UNIT IIIe-3 DRYLAND

This unit consists of deep, well-drained, very gently sloping to gently sloping soils on stream terraces, uplands, and foot slopes. These soils have a moderately coarse textured to coarse-textured surface layer. Some have a moderately coarse textured transition layer. The others have a subsoil that is moderately coarse textured to moderately fine textured. The underlying material is coarse to medium in texture. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderately rapid or moderate permeability and moderate or high available water capacity. Organic-matter content is moderate except in a few areas where it is very low. Natural fertility is low or medium except in a few areas where it is high. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Sufficient rainfall for crop production is lacking during some years. Where the surface is unprotected, soil blowing is a concern of management. Erosion by water can be a hazard on the gently sloping soils during periods of heavy rainfall. Organic-matter content and fertility need to be improved and maintained.

These soils are suited to corn, alfalfa, wheat, sorghum, and grass. Row crops should be grown only 1 or 2 years in

succession. A suitable cropping system should provide a protective cover most of the year, especially in the fall and winter. Cover crops are needed particularly in areas that have been eroded by the wind. Stripcropping, field windbreaks, cover crops, and stubble-mulch tillage can control soil blowing, reduce water erosion, and help to keep the soil productive. Where these soils retain their fertility, they generally produce sufficient residue to protect the surface from blowing. In eroded areas, where the soils have lost most of their organic matter and fine soil particles, working the stubble and other crop residue into the soil helps to increase the supply of organic matter.

CAPABILITY UNIT IIIw-2 DRYLAND

This unit consists of deep, nearly level, poorly drained and somewhat poorly drained soils on high bottom lands and in shallow depressions on uplands. These soils have a medium-textured to moderately fine textured surface layer and a moderately fine textured or fine textured subsoil. The underlying material ranges from coarse to medium in texture. Reaction in the surface layer is slightly acid to moderately alkaline. These soils are occasionally flooded.

Soils in this unit have slow or very slow permeability and moderate or high available water capacity. Organic-matter content is moderate and natural fertility is high. Pounding occurs in the upland depressions, and runoff on the bottom-land areas is slow. These soils absorb moisture slowly and release it slowly to plants. They are difficult to work.

Excessive wetness is a limitation. The subsoil is a claypan that restricts the movement of water through the soil. Rains result in a high water table beneath the bottom-land soils and in flooding of the depressions, which remain ponded for long periods unless drained artificially. Consequently these soils are slow to become warm and to dry out in the spring. Tillage and planting commonly are delayed. As these soils become dry, plant roots have difficulty penetrating the claypan. When they are dry, soil blowing is a hazard unless the surface is adequately protected.

These soils are best suited to crops that are planted late in spring or fall, such as grain sorghum and winter wheat. They also are well suited to grass for pasture and hay. Better row crops are produced if the seed is planted in the ridges of the previous year's rows, because the ridges warm up and dry out sooner than the furrows. Drains can be installed where suitable outlets are available. Ponding in some depressions can be prevented by terracing and providing diversions on adjacent soils at higher elevations.

CAPABILITY UNIT IIIw-4 DRYLAND

This unit consists of nearly level, somewhat poorly drained soils on bottom lands. These soils are deep or moderately deep over mixed sand and gravel. They have a medium-textured surface layer and a medium textured or moderately coarse textured transition layer. The underlying material ranges from medium to coarse in texture. These soils are calcareous. Reaction in the surface layer is moderately alkaline.

Soils in this unit have a permeability that ranges from moderate to very rapid below a depth of 20 inches. Available water capacity is low except in a few places where it is high. Organic-matter content is moderate or moderately low and natural fertility is medium. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work except in spring when they commonly are too wet.

Excessive wetness is the major hazard, and flooding commonly occurs in the low areas on the moderately deep soils. The water table generally is highest early in spring when rainfall is heaviest. These soils warm up and dry out slowly. Tillage and planting are delayed. When the water table falls to its lowest level, usually in the fall, the soils that are moderately deep over mixed sand and gravel are droughty. Soil blowing is a hazard where the surface is unprotected. Available phosphorus is low.

These soils are suited to most of the crops commonly grown in the county but are better suited to wheat, grain sorghum, and, in some places, alfalfa than to other crops. Row crops can be included in the cropping system if the seed is planted in the warm, dry ridges in the residue of the previous year's crop rather than in the cool, moist furrows. Soil tests should be made in order to determine the amount of phosphorus needed for good production.

CAPABILITY UNIT IIIw-6 DRYLAND

Lawet fine sandy loam, drained, is the only soil in this capability unit. This deep, somewhat poorly drained, nearly level soil is on bottom lands. It has a moderately coarse textured surface layer and a medium-textured transition layer. The texture of the underlying material commonly is medium but ranges from moderately fine to coarse. This soil is calcareous to a depth of about 4 feet. Reaction in the surface layer is moderately alkaline. Depth to the water table ranges from 2 to 5 feet.

This soil has moderate permeability and high available water capacity. Organic-matter content is moderate and natural fertility is medium. Runoff is very slow. This fine sandy loam absorbs moisture easily and releases it readily to plants. It is easy to work except in spring when it commonly is too wet.

Excessive wetness is the principal hazard. The water table is highest early in spring when rainfall is heaviest. This soil dries out and warms up slowly. Tillage and planting commonly are delayed. When the water table is at its lowest level, generally late in summer, the soil can be droughty. Soil blowing is a hazard where the surface is unprotected. Available phosphorus, zinc, and iron commonly are lacking. Fertility and organic-matter content need to be improved and maintained.

Most of the crops commonly grown in the county are suited to this soil, but those that can be planted late in spring, such as grain sorghum, or early in fall, such as wheat, are best suited. Many areas are in native grass that is used for hay. Where suitable outlets are available, a drainage system can be installed to lower the water table and alfalfa can be grown. Leaving crop residue on the surface during the fall and winter months can protect the soil from blowing, and mulch planting can help keep the soil productive. Soil tests need to be made in order to determine the needed amounts of phosphorus and, in eroded areas, of zinc and iron.

CAPABILITY UNIT IVe-1 DRYLAND

This unit consists of deep, moderately sloping, well-drained soils on uplands. These soils have a silt loam surface layer and a silt loam or silty clay loam subsoil. The underlying material is silt loam. Most of these soils are slightly

eroded. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is low to moderate, and natural fertility is low to high. Runoff is medium to rapid. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Sufficient rainfall for crop production is lacking during most years. Conservation of moisture is an important concern of management. Erosion by water and soil blowing are the principal hazards where these soils are cultivated. The organic-matter content and fertility need to be improved and maintained.

These soils are well suited to wheat, alfalfa, and grass. Stubble mulching should be practiced when growing wheat, which should be planted after summer fallow. Row crops such as corn and grain sorghum can be grown in alternate years provided measures such as terracing, contour farming, and minimum tillage are used to control erosion by water and soil blowing. Areas not suited to terracing can be used for cover crops and native grass.

CAPABILITY UNIT IVe-3 DRYLAND

This unit consists of deep, well-drained, gently sloping to moderately sloping soils on uplands and old stream terraces. The surface layer is fine sandy loam except in a few places where it is loam, loamy fine sand, or sandy loam. Some of these soils have a fine sandy loam transition layer and the others have a fine sandy loam subsoil. The underlying material ranges from fine sandy loam to loamy fine sand in texture. Reaction in the surface layer is neutral.

Soils in this unit have moderately rapid permeability and moderate or high available water capacity. Organic-matter content is very low to moderate and natural fertility is low to medium. Runoff is slow or medium. These soils absorb moisture easily and release it readily to plants. They are easily worked regardless of moisture conditions.

Where the surface is unprotected, soil blowing is a major hazard. Erosion by water can occur during heavy rainfall. These soils tend to be droughty during periods of below-average rainfall. The organic-matter content and fertility need to be improved and maintained.

These soils are suited to most of the crops commonly grown in the county. Small grains such as wheat and grain sorghum are best suited. Close-growing crops or grass can best protect these soils from erosion by water and damaging winds. Stubble mulching, stripcropping on the contour, terracing fields on long slopes, and returning crop residue to the soil are conservation practices that are needed to control soil blowing and erosion by water.

CAPABILITY UNIT IVe-5 DRYLAND

This unit consists of deep, nearly level to moderately sloping soils on uplands and bottom lands. These soils are well drained to excessively well drained. They have a surface layer of loamy fine sand and a moderately coarse textured transition layer. The underlying material is coarse textured or moderately coarse textured except in a few areas where it is moderately fine textured in part of the profile. Reaction in the surface layer is neutral to moderately alkaline.

Soils in this unit have rapid to moderately rapid permeability; a few areas are moderately permeable in part of the underlying material. Available water capacity is low except in a few areas where it is high. Organic-matter content is low to very low and natural fertility is low. Runoff is slow or very slow. These soils absorb moisture easily and release it readily to plants. Because of the loose consistence of the surface layer, tilth generally is poor.

Lack of moisture is a limitation and can damage young plants and seedlings. Where the surface is not protected, soil blowing is a serious hazard. The blowing sand can damage small plants. Organic-matter content and fertility need to be improved.

These soils are best suited to grass and other close-growing crops. Wheat, rye, and grain sorghum can be grown. Stripcropping, or the planting of crops in narrow strips, should be used in order to prevent wide areas from being subjected to severe soil blowing. A cropping system that keeps the soil covered with growing crops, grass, or residue is needed to help control soil blowing. All crop residue should be returned to the soil, and the practice of summer fallow should be accompanied by a stubble-mulch system.

CAPABILITY UNIT IVe-9 DRYLAND

Coly silt loam, 7 to 9 percent slopes, is the only soil in this capability unit. It is a deep, moderately sloping, well-drained soil on breaks of the uplands. The surface layer, transition layer, and underlying material are medium textured. Reaction in the surface layer is mildly alkaline.

This soil has moderate permeability and high available water capacity. Organic-matter content and natural fertility are low. Runoff is medium. The soil absorbs moisture easily and releases it readily to plants.

Erosion by water and soil blowing are hazards where this soil is cultivated. The organic-matter content and fertility need to be improved. Conserving moisture is an important concern of management.

This soil is best suited to grass, but wheat does well under good management. Other small grains and grain sorghum also can be grown. A year or two of grass in the cropping system helps conserve moisture. Wheat should be alternated with fallow. Conservation practices needed to control erosion by water and soil blowing are terracing, contour farming, stubble mulching, and returning crop residue to the soil. Nitrogen should be added to the soil.

CAPABILITY UNIT IVw-2 DRYLAND

The only mapping unit in this capability unit is Scott soils. These are deep, nearly level, poorly drained soils in depressions on the uplands. The surface layer is medium textured to moderately fine textured, the subsoil is fine textured, and the underlying material is fine to coarse textured. Reaction in the surface layer is neutral.

Soils in this unit have very slow permeability and moderate available water capacity. Organic-matter content is moderately low and natural fertility is medium. Runoff is lacking except in places where drainage has been established. The claypan subsoil, which is near the surface, restricts the movement of water through the soil. It is very hard when dry. These soils release moisture slowly to plants. They are difficult to work; at times they are too wet and at other times they are too dry.

Areas of these soils frequently are flooded. After a heavy rain, water remains on the surface for a long time. When the surface is dry, soil blowing is a hazard where the soils are not adequately protected. Tilth needs to be improved. Roots have difficulty in penetrating the subsoil, particularly when

the moisture content is low. Only about one crop in five is obtained from these areas.

These soils are best suited to grass or hay. Generally they are not well suited to grain crops although, during dry years when flooding is less severe, corn, grain sorghum, and wheat can be grown. Terraces and diversions on adjacent soils at higher elevations can help control flooding. Contour farming on the adjoining land can help prevent runoff reaching these soils and accumulating in depressions. Control of the excess water is difficult because suitable outlets generally are not available. Crop residue needs to be kept on the surface as protection from soil blowing, and all crop residue needs to be returned to the soil during tillage.

CAPABILITY UNIT IVw-4 DRYLAND

This unit consists of nearly level, poorly drained soils on bottom lands. These soils are deep or moderately deep over mixed sand and gravel. The surface layer and transition layer are medium textured, and the underlying material is moderately fine textured to coarse textured. Reaction in the surface layer is moderately alkaline. Calcium-carbonate content ranges from 15 to 40 percent to a depth of 16 inches.

The permeability of soils in this unit is mostly moderate but in some places is very rapid below a depth of 20 inches. The available water capacity is high in the deep soils and low in the moderately deep soils. Organic-matter content is moderate and natural fertility is medium. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They generally are difficult to work because of wetness.

Excessive wetness and deficiencies in available plant nutrients are severe limitations in the use of these soils for most cultivated crops. During most years the surface remains moist until midsummer. Available iron, manganese, copper, and zinc commonly are deficient. The high calcium carbonate content also hinders the uptake of boron and inhibits the absorption of phosphorus by plants. The alkalinity of the surface layer is an additional limitation. In places, soluble salts have accumulated in the root zone. Improving fertility is a concern of management.

Most of the acreage in this capability unit is in native grass that is used for hay. Alfalfa can be grown where the water table is not too near to the surface. If these soils are adequately drained, they are suited to grain crops. Suitable outlets must be available before tile or open ditch systems can provide adequate surface and subsoil drainage.

CAPABILITY UNIT IVw-5 DRYLAND

This unit consists of deep, nearly level to gently sloping, somewhat poorly drained soils on bottom lands. The surface layer is moderately coarse textured to coarse textured, the transition layer is coarse textured, and the underlying material is medium textured to coarse textured. Reaction in the surface layer is moderately alkaline.

Soils in this unit have rapid permeability and low available water capacity. Organic-matter content is low and natural fertility is medium. Runoff is slow to very slow. These soils absorb moisture easily and release it readily to plants. They have loose consistence and are not as easy to work as soils with better tilth.

Excessive wetness is the principal limitation in using these soils, although the moderately high water table can be beneficial when rainfall is inadequate for crop growth, particularly during late summer or fall. Where these soils are cultivated, soil blowing is a hazard. Available phosphorus is low.

These soils are best suited to grass, but alfalfa, corn, and grain sorghum can be grown. To control soil blowing and to help improve the organic-matter content, the cropping system should include return of crop residue to the soil and tillage operations that leave the maximum amount of mulch on the surface. Commercial fertilizers, especially phosphorus, are needed in amounts that can be determined by a soil test. Where suitable outlets are available, the excessive water in these soils can be controlled by installing drainage systems.

CAPABILITY UNIT IVs-1 DRYLAND

This unit consists of nearly level saline-alkali soils on low stream terraces and bottom lands. These soils are deep or moderately deep over mixed sand and gravel and are somewhat poorly drained or moderately well drained. The surface layer is medium textured except in the few places where it is moderately coarse textured. Some of these soils have a medium-textured transition layer and the others have a fine-textured to medium-textured subsoil. The underlying material ranges from fine to coarse in texture. Reaction in the surface layer is mildly alkaline to very strongly alkaline.

The permeability of soils in this unit is mostly slow to moderately rapid but in a few places is very rapid below a depth of 20 inches. The available water capacity is low to high, organic-matter content is low or moderate, and natural fertility is medium to high. Runoff is slow. These soils do not absorb moisture readily because their tilth is poor.

Excess alkalinity and salinity are the principal hazards in using these soils. Because of this condition, the uptake of moisture and nutrients is restricted and some nutrients are not available to plants. Only within a narrow range of moisture conditions are these soils easy to work. The very strongly alkaline soils tend to become puddled where disturbed. If their surface is not protected, saline-alkali soils are subject to soil blowing.

These soils are best suited to tall wheatgrass, grain sorghum, barley, and other crops that tolerate salts and alkali. Under dryland conditions, the normal amount of rainfall is not likely to wash the salts out of the soil. Chemical amendments commonly are unsatisfactory. Stubble mulching, stripcropping, and returning all crop residue to the soil are important management practices that can help control soil blowing. Adding extra amounts of organic matter, such as barnyard manure, can improve soil tilth, structure, and permeability.

CAPABILITY UNIT Vw-7 DRYLAND

This unit consists of very poorly drained to poorly drained, nearly level to very gently sloping soils and land types on bottom lands of large streams and narrow flood plains in upland drainageways. The surface layer is moderately fine textured to moderately coarse textured and the underlying material is medium textured to coarse textured. Reaction in the surface layer is neutral to moderately alkaline. Depth to the water table is from 0 to 40 inches.

Soil materials in this unit have moderate to rapid permeability. The available water capacity, organic-matter content, and natural fertility range from low to high. The organic-matter content in some areas is as high as 15 percent. Runoff is very slow or lacking. These soil materials release moisture readily to plants.

Excessive wetness is the principal hazard. Ponding and boggy areas are common in places.

Figure 16.—**This area of Wet alluvial land, in capability unit Vw-7 dryland, is too wet for cultivated crops. The drainage ditch helps to lower the water table.**

These soils and land types are not suited to cultivated crops (fig. 16). Native plants consists of tall sedges, prairie cordgrass, and canary grass. These provide habitat for wildlife and, in places, can be used for grazing. In Muck areas, the soil material can be removed and can be used as topdressing where lawns are to be established.

CAPABILITY UNIT VIe-1 DRYLAND

This unit consists of deep, well-drained, moderately sloping to steep soils on uplands. These soils are medium textured throughout their profiles. Outcrops of hard limy sandstone are common in a few areas. Reaction in the surface layer is mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is low to moderately low and natural fertility is low to medium. Runoff is medium to rapid. These soils absorb moisture easily and release it readily to plants.

Erosion by water is a severe hazard where these soils are cultivated. Conservation of moisture on these slopes is important to good management.

These soils are well suited to native grass and can be used best for range. Because of steepness and the severe erosion hazard, they are not suited to cultivated crops. Areas now in cultivation need to be seeded to grass and thus converted to rangeland. Management for grazing needs to include the practice of leaving sufficient growth to prevent erosion and to help conserve moisture. These soils can provide habitat for wildlife and areas for recreation.

CAPABILITY UNIT VIe-3 DRYLAND

The only mapping unit in this capability unit is Hersh and Anselmo soils, 9 to 30 percent slopes. These are deep, well-drained, moderately steep to steep soils on deeply dissected uplands. The surface layer is moderately coarse textured to coarse textured, the transition layer or subsoil is moderately coarse textured, and the underlying material is moderately coarse to coarse in texture. Reaction in the surface layer is neutral.

These soils have moderately rapid permeability and moderate to high available water capacity. Organic-matter content is very low to moderate and natural fertility is medium. Runoff is medium.

Erosion by water and soil blowing are hazards where the surface is not protected. Late in summer, when vegetative growth depletes the soil moisture and when rainfall commonly is lacking, these soils become droughty. Conserving moisture is an important concern of management.

These soils are best suited to native grass and can be used best for range. They are not suited to cultivated crops. Areas now in cultivation can be seeded to grass and converted to rangeland. Grazing needs to be controlled so that

a healthy stand of grass can be maintained as a protection against erosion by water and soil blowing.

CAPABILITY UNIT VIe-5 DRYLAND

This unit consists of deep, nearly level to moderately steep, moderately well drained to well-drained soils on uplands and bottom lands. The surface layer, transition layer, and underlying material are moderately coarse textured to coarse textured. Reaction in the surface layer is neutral.

Soils in this unit have moderately rapid to rapid permeability and low or high available water capacity. Organic-matter content is very low to low and natural fertility is low. Runoff is very slow to slow. These soils absorb moisture easily and release it readily to plants.

Soil blowing is the principal hazard and overgrazing can result in small blowouts. These soils are especially droughty when rainfall is low. Conserving moisture and preventing grass fires are important concerns of management.

These soils are well suited to grass and can be used best for rangeland. They are too sandy, too droughty, and too erodible for cultivated crops. Small areas now cultivated should be seeded to grass and returned to rangeland. A protective cover of grass needs to be maintained on the surface at all times.

CAPABILITY UNIT VIe-9 DRYLAND

This unit consists of deep, well-drained, moderately steep to steep soils on uplands. These soils are medium textured throughout their profiles. Reaction in the surface layer is mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content and fertility are low. Runoff is rapid. These soils absorb moisture easily and release it rapidly to plants.

Erosion by water is the principal hazard. Gullies have formed along the side slopes of some canyons. After heavy rains, the narrow bottoms of canyons are flooded for short periods. Maintaining adequate cover is an important concern of management.

These soils are well suited to native grass and can be used best for grazing cattle. They are not suited to cultivated crops. Small areas now cultivated need to be seeded to native grass and returned to rangeland. A vigorous growth of grass needs to be maintained in order to prevent erosion of the soil. In some canyon areas, grade stabilization and flood-prevention structures would help to prevent deep gullying.

CAPABILITY UNIT VIw-4 DRYLAND

Platte-Alda complex is the only mapping unit in this capability unit. It consists of nearly level to gently sloping, somewhat poorly drained soils on bottom lands. These soils are shallow and moderately deep over mixed sand and gravel. The surface layer and transition layer are moderately fine textured to moderately coarse textured, and the underlying material is medium textured to coarse textured. Reaction in the surface layer is moderately alkaline. Depth to the water table ranges from 2 to 5 feet.

Soils in this unit have moderately rapid to very rapid permeability and very low to low available water capacity. Organic-matter content is low to moderate and natural fertility is low or medium. Runoff is slow. These soils absorb moisture easily and release it readily to plants.

Excessive wetness resulting from the shallow depth to water is a limitation in the use of this soil. Flooding is a minor hazard. Late in summer, when the water table is at its lowest level, these soils are droughty unless rainfall is adequate. Small areas of excessive alkalinity and salinity are a minor concern in some places.

These soils are well suited to grass and can be used best for rangeland. They are not suited to cultivated crops. Areas that now are cultivated need to be reseeded to grass and converted to rangeland. Shallow drainage ditches can be used to remove excess surface water. However, lowering the water table is not desirable for the best grass production because these soils generally are droughty in the midsummer months.

CAPABILITY UNIT VIs-4 DRYLAND

Dix complex, 5 to 30 percent slopes, is the only mapping unit in this capability unit. It consists of gently sloping to steep, excessively drained soils on gravelly uplands. These soils are shallow over mixed sand and gravel. The surface layer and transition layer are medium textured to moderately coarse textured, and the underlying material, below depths of 10 to 40 inches, is coarse sand and gravel. In some places gravel is at the surface. Reaction in the surface layer is neutral.

Permeability in soils in this unit is moderately rapid except in the gravelly underlying material, where it is very rapid. The available water capacity is very low and organic-matter content and natural fertility are low. Runoff is very slow or lacking. These soils absorb moisture rapidly and release it readily to plants.

Droughtiness resulting from the low available water capacity is the principal limitation in using this soil. Where the surface is unprotected, soil blowing is a hazard. Conserving water is important to good management.

These soils are well suited to native grass and can be used best for rangeland. They are too shallow for growing cultivated crops. The annual production of grass is generally lower on these soils than on deeper soils. Deferred grazing and a planned grazing system are necessary to good management.

CAPABILITY UNIT VIIe-5 DRYLAND

This unit consists of deep, undulating to very steep soils and land types on sandy uplands. These soil materials are excessively drained. They are coarse textured throughout their profiles. Reaction in the surface layer is neutral.

Soils and land types in this unit have rapid permeability and low available water capacity. Organic-matter content and natural fertility are low. Runoff is very slow. These soil materials absorb moisture easily and release it readily to plants.

Low fertility, low available water capacity, and low organic-matter content are severe limitations to the use of these soils and land types for growing cultivated crops. Soil blowing is the principal hazard. Blowouts occur where these soil materials are not adequately protected, and the shifting sand can damage vegetation on adjacent soils. Overgrazing and grass fires are concerns of management.

These sandy, steep soil materials are well suited to native grass and can be used best for rangeland. A good grass cover helps to keep soil blowing to a minimum and also increases the organic-matter content. Blowouts generally need to be reshaped, seeded to native grasses, and then mulched to prevent blowing during establishment of the grass. Returning these areas to rangeland not only restores the productivity

of the area but also prevents further damage to adjacent areas from shifting sand.

CAPABILITY UNIT VIIe-7 DRYLAND

Rough broken land, loess, is the only mapping unit in this capability unit. This land type consists of deep, steep to very steep soil materials on uplands that are deeply dissected by numerous canyons. It is medium textured and excessively drained. Reaction in the surface layer is mildly alkaline to moderately alkaline.

This soil material has moderate permeability and high available water capacity. Organic-matter content is low to very low and natural fertility is low. Very rapid runoff results in little moisture being stored in the soil material. Moisture is released readily to plants.

Steepness is a severe limitation to the production of cultivated crops. Erosion by water is the principal hazard. Heavy rains can cause gullies not only at the heads of canyons but also in the bottoms of canyons. Maintaining an adequate ground cover and conserving moisture are concerns of management.

This land type is suited to native grass and, where it is not too steep, can be used for grazing. A good grass cover needs to be maintained in order to reduce erosion and conserve moisture. Many areas of this soil material provide suitable sites for stockwater dams, grade-control structures, and flood-detention reservoirs. They also provide habitat for wildlife.

CAPABILITY UNIT VIIs-3 DRYLAND

Gravelly alluvial land is the only mapping unit in this capability unit. This land type consists of nearly level to gently sloping soil material in former channels of the Platte River and on islands between braided channels of the river. It generally is somewhat poorly drained but is poorly drained in places where water covers the surface in the spring. Materials in the surface layer, which is 1 to 20 inches thick over mixed sand and gravel, range from fine to coarse in texture.

This soil material has very rapid permeability and very low available water capacity. Organic-matter content is very low and natural fertility is low.

The shallow depth, very low available water capacity, and low fertility of the soil material limits vegetation to only a few kinds of adapted plants. Wetness and flooding are hazards in some areas.

This land type is well suited to native grass that can provide a permanent type of vegetation. It is too shallow and too gravelly for cultivation but can be used for range. Overgrazing needs to be prevented as this reduces the vigor of the grasses and limits productivity.

CAPABILITY UNIT VIIIw-7 DRYLAND

Marsh is the only mapping unit in this capability unit. This nearly level land type is on bottom lands adjacent to the Platte River and a few smaller streams. It also occurs in upland depressions that receive seepage water from adjacent reservoirs. The soil material is medium textured or moderately coarse textured and has a high content of organic matter. Areas of Marsh have water over the surface during most of the year.

Because of wetness, this land type is not suited to range or trees. Vegetation is mainly cattails, bullrushes, common reedgrasses, willows, and other plants that can tolerate excess moisture. Late in summer, during some years, the drier areas afford limited grazing. Marsh provides habitat for wildlife and areas for recreation. In some places ditches would improve the areas as habitat for waterfowl and other kinds of wetland wildlife.

CAPABILITY UNIT VIIIs-7 DRYLAND

Riverwash is the only mapping unit in this capability unit. This nearly level to very gently sloping land type occurs on islands between the braided channels of the Platte River. It consists of coarse-textured, poorly drained soil material that is frequently flooded.

Wetness and the coarse texture of the material are severe limitations to desirable plant growth. Vegetation in low-lying areas consists of only sparse stands of willows and reeds. Other areas are covered with sparse to moderate amounts of grass, forbs, woody shrubs, and trees. Because the vegetative cover is low in quality and low in productivity, it generally does not provide sufficient grazing for cattle. It does provide browse for deer and food and habitat for birds and other wildlife. Ducks and geese frequent the sandbars. Areas of Riverwash are used for recreation, and some landowners realize profits from lease fees obtained from sportsmen for the privilege of hunting on these areas.

Management by irrigation capability units

Capability units for growing crops under an irrigation system of management in Lincoln County are described on the following pages. Common features of the soils in each unit are discussed and properties useful to management are given. Crops suited to this kind of management are listed and the hazards and limitations are described together with practices that help to overcome them.

Most of the soils in Nebraska are assigned to Irrigation Design Groups. These design groups are described in the "Irrigation Guide for Nebraska." The arabic number in the irrigation capability unit indicates the design group to which the included soils belong. For example, capability unit IIe-6 irrigated, indicates that soils in this unit are in Irrigation Design Group 6 in the Nebraska Irrigation Guide. A copy of this Guide is in each field office of the Soil Conservation Service in Nebraska.

CAPABILITY UNIT I-3 IRRIGATED

Cozad silty clay loam is the only soil in this unit. It is a deep, well-drained, nearly level soil on stream terraces. The surface layer is moderately fine textured and the subsoil and underlying material are medium textured. Reaction in the surface layer is mildly alkaline.

The soil in this unit has moderate permeability and high available water capacity. Organic-matter content is moderately low and natural fertility is medium. Runoff is slow. This soil is easy to work.

This soil is well suited to irrigation. Erosion by water is a hazard only when there is heavy rain soon after applications of irrigation water. Improving the fertility is a concern of management.

Alfalfa and corn are the principal irrigated crops grown on this soil. Fertility can be improved and maintained by the addition of commercial fertilizers.

Any of the commonly used irrigation systems are suited to this soil. In spite of its high available water capacity, this soil has the lowest intake rate of any soil in Lincoln County. Application rates of water need to be low, but lengths of irrigation runs can be relatively long.

CAPABILITY UNIT I-4 IRRIGATED

This unit consists of deep, nearly level soils on uplands, stream terraces, and high bottom lands. These soils are well drained or moderately well drained. The surface layer is medium textured. Some of these soils have a medium textured or moderately fine textured transition layer and the others have a medium textured to moderately fine textured subsoil. The underlying material is medium textured except in places where the lower part is coarse textured. Reaction in the surface layer is neutral or mildly alkaline.

Soils in this unit have moderate to moderately slow permeability and high to moderate available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work.

These soils are some of the most desirable in Lincoln County for growing irrigated crops. They have few limitations and hazards. Erosion by water is a concern only when there is heavy rain immediately after the application of irrigation water. Maintaining the organic-matter content is a concern of management.

Corn, sorghum, and alfalfa are well suited to these soils. All other crops commonly grown in the county also are suited. Returning all crop residue to the soil during the preparation of seedbeds helps maintain the organic-matter content.

Sprinkler irrigation is well suited to these soils. Some land leveling generally is necessary for the even distribution of water under furrow and border systems. Re-use systems that return excess water back into the irrigation system can lessen the runoff, which can occur as the result of the moderately low intake rate. Application rates of the irrigation water need to be low, but irrigation runs can be longer than for most soils.

CAPABILITY UNIT I-6 IRRIGATED

This unit consists of deep, nearly level to very gently sloping soils on uplands, stream terraces, and bottom lands. These soils are well drained or moderately well drained. The surface layer is moderately fine textured to moderately coarse textured. Some of these soils have a moderately fine textured to medium-textured transition layer and the others have a moderately fine textured to moderately coarse textured subsoil. The underlying material is moderately fine to coarse in texture. Reaction in the surface layer is neutral to moderately alkaline.

Permeability is moderate except in a few soils where it is moderately rapid in the underlying material. The available water capacity is moderate or high, organic-matter content is moderately low or moderate, and natural fertility is medium or high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easily worked.

These soils are among the most productive in Lincoln County. They have few limitations and hazards for growing irrigated crops. Maintaining the organic-matter content and a high fertility level are the principal concerns of management.

All crops commonly grown in the county are suited to these soils. The organic-matter content can be maintained by returning all crop residue to the soil. Commercial fertilizers can provide sufficient nutrients for the crops.

Any of the commonly used irrigation systems are suited to these soils. An even distribution of irrigation water under a gravity system can be obtained by leveling the land. However, the lengths of furrows and of irrigation runs need to be relatively short because these soils have a moderate intake rate and absorb the water as it flows down the furrow or across the field.

CAPABILITY UNIT IIe-4 IRRIGATED

This unit consists of deep, well-drained, very gently sloping soils on uplands. These soils have a medium-textured surface layer, a moderately fine textured to medium-textured subsoil, and medium-textured underlying material. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate or moderately slow permeability and high available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easy to work and have good tilth.

Erosion by water is the principal hazard where these soils are irrigated, especially when heavy rainfall occurs immediately after the application of the irrigation water. Improving organic-matter content and maintaining the fertility are concerns of management.

All of the major crops produced in Lincoln County are suited to these soils. Erosion can be controlled by using alfalfa or an alfalfa-grass mixture in the cropping sequence and by using mulch tillage. Fertility can be maintained by the use of fertilizers, and the organic-matter content can be improved by returning crop residue to the soil.

Any of the commonly used irrigation systems are suited to these soils. Because the intake rate is moderately low, the rate of water application needs to be adjusted to prevent excessive runoff. Relatively long irrigation runs can be used on these soils.

CAPABILITY UNIT IIe-5 IRRIGATED

This unit consists of deep, nearly level to very gently sloping soils on uplands, foot slopes, and stream terraces. These soils are moderately well drained to well drained. The surface layer is moderately coarse textured. Some of these soils have a medium-textured transition layer and the others have a medium-textured or moderately fine textured subsoil. The underlying material is medium or moderately fine in texture. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work over a wide range of moisture conditions.

Soil blowing is the principal hazard where these soils are cultivated.

All of the crops commonly grown in Lincoln County are suited to these soils. Leaving crop residue on the surface of the soil during seedbed and planting operations can help control soil blowing.

Any of the commonly used irrigation systems are suited to these soils. Because of the moderate intake rate, relatively high rates of water application and relatively short irrigation runs are possible.

CAPABILITY UNIT IIe-6 IRRIGATED

This unit consists of deep, very gently sloping soils on uplands, foot slopes, and stream terraces. These soils are well drained to moderately well drained. They are medium textured throughout their profiles except for the subsoil,

which is medium textured to moderately fine textured. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderate to moderately low and natural fertility is medium to high. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Erosion by water is the principal hazard. Soil blowing can occur in early spring if the surface cover is inadequate. Improving and maintaining the organic-matter content and fertility are concerns of management.

All of the crops commonly grown in Lincoln County are suited to these soils. Leaving crop residue on the surface of the soil during seedbed and planting operations helps to control erosion by water and soil blowing. Organic-matter content can be maintained by returning all residue to the soil. Use of commercial fertilizers and barnyard manure improves fertility.

Any of the commonly used irrigation systems are suited to these soils. Sprinkler systems are well adapted to the steeper soils, where furrow irrigation is less efficient. In gravity systems, using furrows on the contour can reduce erosion. Runoff can be collected in pits and used to irrigate other cropland.

CAPABILITY UNIT IIe-8 IRRIGATED

This unit consists of deep, nearly level to very gently sloping soils on bottom lands, stream terraces, uplands, and swales on the uplands. These soils are well drained or moderately well drained. They have a moderately coarse textured surface layer and a medium textured to moderately coarse textured transition layer or a medium textured to coarse-textured subsoil and moderately fine textured to coarse-textured underlying material. Reaction in the surface layer ranges from neutral to moderately alkaline.

Soils in this unit have moderately rapid permeability and moderate or high available water capacity. Organic-matter content is moderately low or moderate and natural fertility is medium or high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work over a wide range of moisture conditions.

Where surface cover is inadequate, soil blowing is a concern early in spring and late in fall. Erosion by water is a hazard on the gently sloping areas. Available phosphate generally is low.

All of the crops commonly irrigated in Lincoln County are suited to these soils. Soil blowing can be controlled by maintaining cover on the surface of the land. Stripcropping prevents exposure of large areas to the wind and can be used to reduce soil blowing and erosion by water.

Any of the commonly used irrigation systems are suited to these soils. If the furrow system is used, a high rate of water application is needed because these soils have a moderately high intake rate. Irrigation runs need to be relatively short. The soils having a moderate available water capacity need to be irrigated more often than those having a high available water capacity.

CAPABILITY UNIT IIw-6 IRRIGATED

This unit consists of deep, nearly level to very gently sloping soils on stream terraces that receive seep water and soils on narrow flood plains in upland drainageways that are occasionally flooded. These soils are somewhat poorly drained or moderately well drained. They have mostly medium-textured profiles. Soil reaction in the surface layer is neutral or mildly alkaline.

Soils in this unit have moderate permeability and moderate or high available water capacity. Organic-matter content is moderate or moderately low and natural fertility is medium or high. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Because of wetness, the seeped soils warm up slowly in the spring and planting is delayed. Flooding occurs mainly in the spring. Erosion by water forms gullies in places, but these generally are filled by plowing during tillage operations.

Alfalfa and irrigated pasture are well suited to the seeped soils on terraces. Corn, grain sorghum, alfalfa, and grass are suited to the upland floodplain soils. In places flooding of upland drainageways can be controlled by diversions on adjacent soils at higher elevations.

Border, furrow, and sprinkler irrigation systems are suited to these soils.

CAPABILITY UNIT IIw-8 IRRIGATED

This unit consists of deep, nearly level, somewhat poorly drained soils on bottom lands. The surface layer is medium textured to coarse textured and the underlying material is moderately coarse textured to coarse textured. These soils are calcareous. Reaction in the surface layer is moderately alkaline. In places are a few small areas of saline-alkali soils.

Soils in this unit have moderately rapid permeability and high available water capacity. Organic-matter content is moderately low and natural fertility is medium. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work over a wide range of moisture conditions.

Because of wetness, these soils warm slowly in the spring and tillage and planting are delayed. When the water table is at its maximum depth, generally in middle and late summer, these soils become droughty and crops need supplemental water.

Hay and pasture crops such as alfalfa and irrigated grass are best suited to these soils, but all of the other crops commonly grown in Lincoln County can be produced. Phosphorus can be added, particularly for legumes. To help control wetness, open V-ditches or tile drains can be installed where suitable outlets are available.

Any of the commonly used irrigation systems are suited to these soils. The furrow and border systems require high rates of water application and short runs, because these soils have a moderately high intake rate.

CAPABILITY UNIT IIIe-4 IRRIGATED

This unit consists of deep, gently sloping, well-drained soils on uplands. These soils have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. The underlying material is medium textured. Many areas are moderately eroded. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderate and natural fertility is high except in eroded areas where it is medium. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easy to work in the uneroded areas, but in eroded areas more power is needed to till the soil and tilth is not as good.

Erosion by water and soil blowing are the principal hazards. Where heavy rains occur immediately after applications of

irrigation water, runoff is increased and erosion damages the soil. Improving the organic-matter content and maintaining fertility are concerns of management.

Alfalfa and grass for irrigated pasture are well suited to these soils. Row crops, such as corn and sorghum, can be grown under irrigation methods that do not contribute to erosion. Fertility and the organic-matter content can be improved and maintained by the use of commercial fertilizers, barnyard manures, and by a cropping system that includes frequent small grain and hay crops.

Sprinkler irrigation systems are well suited to these soils provided that suitable installations prevent runoff from excessive irrigation and rainfall. Gravity systems are suited for irrigating row crops if the area is reshaped so that contour bench irrigation can be used. Because the intake rate of these soils is moderately low, applications of water need to be regulated so as to avoid erosion and runoff.

CAPABILITY UNIT IIIe-5 IRRIGATED

This unit consists of deep, well-drained, gently sloping soils on uplands and on foot slopes adjacent to uplands. The surface layer is medium textured to moderately coarse textured. Some of these soils have a medium-textured transition layer and the others have a moderately fine textured to medium-textured subsoil. The underlying material is medium textured. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content ranges from low in eroded areas to moderate in uneroded areas. Natural fertility generally is high but can be low in eroded areas. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easily worked over a wide range of moisture conditions.

Soil blowing early in spring and late in fall and erosion by water are the principal hazards where these soils are used for crops. Maintaining the fertility and improving the organic-matter content are concerns of management.

Close sown crops, such as small grains, alfalfa, and grass, are particularly well suited to these gently sloping soils, but corn and sorghum also can be grown under irrigation. Leaving crop residue on the surface of the soil reduces soil blowing and erosion by water. Adding crop residue to the soil during seedbed preparation improves the organic-matter content. Fertility can be maintained by the use of commercial fertilizers and barnyard manure.

Sprinkler irrigation is best suited to this soil, but any of the common systems can be used. The intake rate of these soils is moderate.

CAPABILITY UNIT IIIe-6 IRRIGATED

This unit consists of deep, gently sloping, moderately well drained to well-drained soils on foot slopes, stream terraces, and uplands. These soils are medium textured throughout their profiles. A few areas are moderately eroded. Reaction in the surface layer ranges from neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderate or moderately low and natural fertility is medium or high. Runoff is slow to medium. These soils absorb moisture easily and release it readily to plants. They are easily worked and have good tilth.

Erosion by water is the principal hazard and is most severe where heavy rains occur immediately after irrigation. Soil blowing is a concern early in spring and late in fall.

Close-growing crops, such as small grains, alfalfa, and grass, are particularly well suited to these soils but corn and grain sorghum can be grown. A cropping system that includes mulch tillage and keeps crop residue on the surface of the soil reduces erosion by water and soil blowing.

Sprinkler irrigation is best suited to these soils. Furrow systems are satisfactory for corn and sorghum if the erosion hazard is minimized by using contour furrows or contour bench leveling to reduce the grade. Contour ditch systems are suited for use with small grains and hay crops. These soils have a moderate intake rate.

CAPABILITY UNIT IIIe-8 IRRIGATED

This unit consists of deep, well-drained, very gently sloping to gently sloping soils on stream terraces and uplands. The surface layer is moderately coarse textured to coarse textured. Some of these soils have a moderately coarse textured transition layer and the others have a moderately coarse textured subsoil. The underlying material ranges from moderately coarse to coarse in texture. Reaction in the surface layer is neutral.

Soils in this unit have moderately rapid permeability and moderate or high available water capacity. Organic-matter content is very low to moderate and natural fertility is low or medium. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easy to work over a wide range of moisture conditions.

Soil blowing is the principal hazard where these soils are cultivated. Erosion by water is a concern when there are heavy rains immediately after irrigation. Improving and maintaining the fertility and organic-matter content are concerns of management.

Alfalfa and grass for pasture are particularly well suited to these soils, but all of the crops commonly grown in Lincoln County can be produced. Low residue crops, such as sugarbeets and potatoes, can be grown in narrow fields or strips to protect the soils from blowing. A cropping system that includes mulch planting and retaining crop residue on the surface reduces erosion by water and soil blowing. Fertility and organic-matter content can be improved and maintained by adding barnyard manure and by keeping all crop residue on the soil.

Sprinkler irrigation is best suited to these soils. Center-pivot systems are well adapted for use on irrigated pastures, because such systems provide light frequent applications of water and these soils have a moderately high intake rate. The length of run in contour irrigation or contour bench leveling systems should be short.

CAPABILITY UNIT IIIe-11 IRRIGATED

Dunday loamy fine sand, 0 to 3 percent slopes, is the only soil in this capability unit. This is a deep, somewhat excessively drained, nearly level to very gently sloping soil on uplands. It is loamy fine sand throughout the profile except in places where the underlying material is loam or sandy loam. Reaction in the surface layer is neutral.

This soil has rapid permeability and low available water capacity. Organic-matter content is low and natural fertility is medium. Runoff is slow. This soil absorbs moisture easily and releases it readily to plants. It is difficult to work when dry because of its loose consistency.

Soil blowing is a severe hazard where this soil is cultivated. Because of its low available water capacity, this soil can be droughty unless it is properly managed. Improving and

maintaining the organic-matter content and fertility are concerns of management. The phosphorus content is likely to be low.

High residue crops, such as corn and sorghum, are suited to this soil. Alfalfa for hay and grass for pasture are also well suited. Such low residue crops as sugarbeets, potatoes, and field beans should not be grown. Mulch tillage and leaving crop residue on the surface during seedbed and planting operations reduces soil blowing. Using commercial fertilizers and manure and returning crop residue to the soil help improve and maintain fertility and organic-matter content.

Sprinkler irrigation is well suited to this soil, which has a very high intake rate and thus is not suited to furrow or border irrigation systems. Center-pivot systems are particularly well suited because they provide frequent applications of water and thus prevent drying out of the soil.

CAPABILITY UNIT IIIw-2 IRRIGATED

This unit consists of deep, nearly level soils in upland depressions and on bottom land. These soils are poorly drained or somewhat poorly drained. They have a medium textured to moderately fine textured surface layer, a moderately fine textured to fine-textured subsoil, and moderately fine to coarse-textured underlying material. Reaction in the surface layer is slightly acid to moderately alkaline.

Soils in this unit have slow to very slow permeability and moderate or high available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow or ponded. The subsoil releases moisture slowly to plants. These soils are difficult to work, particularly when wet.

Excessive wetness is the principal hazard. In the shallow depressions of the uplands, the soils are subject to flooding. Soils on the bottom lands are affected by the high water table. They are slow to warm up and dry out in the spring, thus delaying seedbed preparation and planting.

Most of the crops commonly grown in Lincoln County are suited to these soils. The use of barnyard manure and mulch of crop residue can improve the tilth of these soils. Flooding in the depressions can be prevented by the use of diversions or other structures. Drainage can be improved on the bottom-land soils by ditches or tile drainage systems.

Sprinkler irrigation is best suited to these soils, although gravity systems can be used if the land is leveled adequately. Because the intake rate of these soils is low, the rate of water application needs to be low and runs need to be short enough to avoid ponding or runoff.

CAPABILITY UNIT IIIw-5 IRRIGATED

Lawet fine sandy loam, drained, is the only soil in this capability unit. This is a deep, nearly level, somewhat poorly drained soil on bottom lands. It has a moderately coarse textured surface layer and a medium-textured transition layer. The underlying material ranges from moderately fine to coarse in texture. The surface layer has a very high content of lime carbonate. Reaction in the surface layer is moderately alkaline.

This soil has moderate permeability and high available water capacity. Organic-matter content is moderate and natural fertility is medium. Runoff is very slow. This soil absorbs moisture easily and releases it readily to plants. It is easy to work over a wide range of moisture conditions.

Wetness is the principal hazard. Tillage and planting are delayed because the soil is slow to warm up and dry out in the spring. Soil blowing is a hazard where the surface is not protected. Because of the excess lime carbonate, improving and maintaining the fertility and organic-matter content are important concerns of management.

Corn, sugarbeets, alfalfa, and grass are suited to this soil. Alfalfa is particularly well suited because of the lime content. Mulch tillage improves the organic-matter content, and leaving the crop residue on the surface reduces soil blowing. Fertility can be improved by the addition of commercial fertilizers and barnyard manure.

Any of the commonly used irrigation systems are suited to this soil. An even application of water and the removal of excess irrigation water can be assured by land leveling.

CAPABILITY UNIT IIIw-6 IRRIGATED

Lawet silt loam, drained, is the only soil in this capability unit. This is a deep, nearly level, somewhat poorly drained soil on bottom lands. It has a medium-textured surface layer and a medium-textured transition layer. The underlying material ranges from moderately fine to coarse in texture. The surface layer has a high content of lime. Reaction in the surface layer is moderately alkaline.

This soil has moderate permeability and high available water capacity. Organic-matter content is moderate and natural fertility is medium. Runoff is slow. This soil absorbs moisture easily and releases it readily to plants.

Excessive wetness is the principal hazard. Some areas are frequently flooded. This soil warms slowly in the spring, and tillage and planting are delayed. Because of the high lime carbonate content, improving the fertility is an important concern of management.

Legumes such as alfalfa are particularly well suited to this soil because of its high lime content. Corn, sugarbeets, and small grains planted in spring also are suited. The cropping sequence should require minimum tillage operations and should not necessitate seedbed preparations until late in spring. Soil tests need to be made in order to determine the proper commercial fertilizers that are needed to improve the fertility.

Any of the commonly used irrigation systems are suited to this soil, which has a moderate intake rate. However, the rate of water application should not exceed the intake rate. For gravity systems, land leveling is needed to make the surface smooth enough to insure even distribution of irrigation water and yet facilitate removal of excess surface water.

CAPABILITY UNIT IIIw-7 IRRIGATED

This unit consists of nearly level, somewhat poorly drained soils on bottom lands. These soils are moderately deep over mixed sand and gravel. The surface layer is mainly medium textured but in places is moderately coarse textured. Some of these soils have a moderately coarse textured transition layer. The upper part of the underlying material is medium textured or moderately coarse textured, and the lower part is mixed coarse sand and gravel below a depth of about 30 inches. Reaction in the surface layer is moderately alkaline.

Permeability of the soils in this unit is moderate or moderately rapid in the upper part and very rapid in the sand and gravel. Available water capacity is low, organic-matter content is moderate or moderately low, and natural fertility is medium. Runoff is slow. These soils absorb moisture easily and release it readily to plants. They are easily worked except sometimes early in spring when they are too wet.

Wetness is the principal hazard. These soils are flooded

occasionally in low places. They warm up and dry out slowly in spring, and seedbed preparation and planting are delayed. Late in summer when the water table is at its lowest level, these soils become droughty. In the fall soil blowing is a hazard where protective cover is inadequate. Improving the fertility and organic-matter content are concerns of management.

Corn, sugarbeets, alfalfa, and grasses are suited to these soils. A cropping system that includes a variety of crops and the addition of all crop residue to the soil can improve the organic-matter content, tilth, and fertility. Where suitable outlets are available, open drains or tile drains can be used to remove excess water.

Any of the commonly used irrigation systems are suited to these soils. Gravity systems generally necessitate land leveling so as to provide a surface smooth enough for even distribution of irrigation water. Leveling needs to be controlled because of the danger of exposing the coarse underlying material where deep cuts are made. These soils have a moderate to moderately high intake rate, but their available moisture capacity is low. Applications of irrigation water need to be small but frequent, and the rate of application needs to be adjusted to the rate at which water can enter the soil.

CAPABILITY UNIT IIIs-4 IRRIGATED

Lawet silt loam, saline-alkali, is the only soil in this capability unit. This is a nearly level, somewhat poorly drained soil on bottom lands. It is generally deep but in places is 20 to 40 inches thick over coarse sand and gravel. This soil has a medium-textured to moderately coarse textured surface layer and a moderately coarse textured transition layer. The underlying material ranges from moderately fine to coarse in texture. Reaction in the surface layer is moderately alkaline to very strongly alkaline.

This soil has moderate permeability and high available water capacity. Organic-matter content is moderate and natural fertility is medium. Runoff is slow. This soil absorbs and releases moisture more slowly than less alkaline soils. Excessive sodium makes the soil subject to puddling. This soil is not easy to work.

The high alkalinity slows the uptake and limits the availability of most plant nutrients. Because of the moderately high water table, this soil warms slowly in the spring and thus delays tillage and planting. Improving and maintaining the fertility and organic-matter content are concerns of management.

All of the crops commonly grown in Lincoln County are suited to this soil. Tall wheatgrass and other native grasses are best suited on the more strongly alkaline areas. The alkalinity and salinity can be reduced by lowering the water table. Open drains or tile drains can be installed where suitable outlets are available. Adding organic matter such as barnyard manure to the more alkaline spots can improve permeability in these areas. A cropping system that utilizes a surface mulch of crop residue improves the fertility and organic-matter content of the soil.

Any of the commonly used methods of irrigation are suited to this soil. For gravity systems, land leveling is needed to insure the even distribution of irrigation water. Because the intake rate of this soil is moderately low, application of water needs to be regulated to prevent excessive runoff. Excessive applications can be used to remove salt from the soil provided a satisfactory drainage system has been installed.

CAPABILITY UNIT IIIs-6 IRRIGATED

This unit consists of deep, nearly level saline-alkali soils on stream terraces and bottom lands. These soils are well drained or moderately well drained. They are mainly medium textured throughout their profiles, but the surface layer is moderately coarse textured in places and the underlying material ranges to coarse textured in some areas. Reaction in the surface layer of these soils is mildly alkaline to very strongly alkaline. Excessive salinity is present in the surface layer, throughout most of the unit and also is common in the subsoil.

Soils in this unit have moderate permeability and moderate or high available water capacity. Organic-matter content is moderate or moderately low and natural fertility is medium or high. Runoff is slow. These soils absorb and release moisture more slowly than soils that are not so alkaline. They are subject to puddling, caused by excessive sodium, and are not easy to work.

The excessive alkalinity and salinity slow the uptake and limit the availability of most plant nutrients. Because of the moderately high water table and slow runoff, these soils warm slowly in the spring. Tillage and planting generally are delayed. Improving and maintaining the organic-matter content are concerns of management.

Crops tolerant of salinity and alkalinity are best suited to these soils, but all of the crops commonly grown in Lincoln County can be produced. Tall wheatgrass is particularly well adapted for irrigated hay and pasture. A cropping system that permits the return of large amounts of crop residue to the soil improves the organic-matter content, fertility, friability, and permeability.

Any of the commonly used irrigation systems are suited to these soils. For gravity systems, land leveling is needed to assure even distribution of the irrigation water. These soils have a moderate intake rate. In places drainage is needed to lower the water table.

CAPABILITY UNIT IIIs-7 IRRIGATED

Lex loam, saline-alkali, is the only soil in this capability unit. It is a nearly level, somewhat poorly drained soil on bottom lands. It is moderately deep over mixed sand and gravel. This soil has a medium-textured surface layer and fine-textured to coarse-textured underlying material. Reaction in the surface layer is moderately alkaline to very strongly alkaline.

The permeability of this soil is moderate except in the lower part of the underlying material where it is very rapid. Available water capacity is low, organic-matter content is moderately low, and natural fertility is medium. Runoff is slow. This soil absorbs and releases moisture more slowly than soils that are less alkaline. It is subject to puddling, because of excessive sodium, and can be tilled only over a narrow range of moisture content.

Excessive alkalinity and salinity slow the uptake and limit the availability of most plant nutrients. Wetness resulting from occasional flooding and the high water table is a hazard. This soil warms up slowly in the spring, and tilling and planting are delayed. The low available water capacity is a limiting factor in crop production. Improving the fertility and organic-matter content are concerns of management.

Close-sown crops, such as alfalfa and grass, are best suited to this soil, but corn, grain sorghum, and sugarbeets can be grown. Productivity can be increased by permanently lowering the water table. Where suitable outlets are available, this

can be accomplished by installing open or tile drains. Improved drainage will allow the soil to warm up more quickly in the spring. Acid-forming materials such as sulphur can be used to help neutralize the high alkalinity. Adding large amounts of barnyard manure or other organic matter will lower the alkalinity and salinity by increasing the permeability and friability, thus allowing the excess alkali to be leached from the soil. The use of commercial fertilizers and manure improves the fertility and organic-matter content.

Any of the commonly used irrigation systems are suited to this soil. For gravity systems, land leveling is needed to insure an even distribution of the irrigation water. The intake rate of this soil is moderate, but more frequent applications are needed than on soils that have a higher available moisture capacity.

CAPABILITY UNIT IIIs-8 IRRIGATED

Wann fine sandy loam, saline-alkali, is the only soil in this capability unit. It is a deep, nearly level, somewhat poorly drained soil on bottom lands. This soil is moderately coarse textured to coarse textured throughout the profile. Reaction in the surface layer is moderately alkaline to very strongly alkaline. In most places the surface layer contains excess salts.

The soil in this unit has moderately rapid permeability and high available water capacity. Organic-matter content is moderately low and natural fertility is medium. Runoff is slow. This soil absorbs moisture easily and releases it readily to plants except where the alkalinity is very strong. It is easy to work in all of the areas where the sodium content is not excessive.

Excessive alkalinity and salinity limit the uptake and availability of plant nutrients. Wetness is a hazard. Because the soil is slow to warm up and dry out early in spring, tilling and planting are delayed. Lowering the soil reaction in the rooting zone, improving the internal drainage, and improving the fertility and organic-matter content are concerns of management.

Tall wheatgrass, sugarbeets, grain sorghum, and other alkali-tolerant crops are suited to this soil in areas where suitable outlets for drainage are not available and opportunities for altering the alkaline condition are not favorable. Corn can be grown in areas where suitable drainage outlets are available if open ditch or tile drains are used to lower the water table. Adding sulphur to the soil tends to form acid materials that neutralize the alkalinity, and excessive irrigation can be used to flush salts out of the soil.

Sprinkler irrigation is best suited to this soil, but gravity-furrow systems can be used. For gravity systems, land leveling is needed to insure an even distribution of the irrigation water. The intake rate of this soil is moderately high, and irrigation runs in gravity systems need to be relatively short.

CAPABILITY UNIT IVe-4 IRRIGATED

The only mapping unit in this capability unit is Holdrege and Uly silt loams, 7 to 9 percent slopes. It consists of deep, well-drained, moderately sloping soils on uplands. These soils have a medium-textured surface layer and a medium textured or moderately fine textured subsoil. The underlying material is medium textured. Reaction in the surface layer is neutral to mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderate or moderately low and natural fertility is medium or high. Runoff is rapid. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Erosion by water is the principal hazard and is severe when there is heavy rainfall occuring immediately after the soils are irrigated. Small rills or gullies form quickly unless the soil is protected.

Close-sown crops such as small grains and alfalfa are best suited to these soils under irrigation. Grasses are well suited for irrigated pasture. Ground cover is needed to help control erosion by water on these soils.

Sprinkler irrigation is best suited to these soils. Erosion in the wheel tracks can be a concern where center-pivot systems are used. Gravity systems are not well suited unless the grade can be lowered. The intake rate of these soils is moderately low. The rate of water application needs to be adjusted to prevent excessive runoff.

CAPABILITY UNIT IVe-6 IRRIGATED

This unit consists of deep, well-drained, moderately sloping soils on uplands. These soils have a silt loam surface layer and are medium textured throughout their profiles. They are severely eroded in places. Reaction in the surface layer is mildly alkaline.

Soils in this unit have moderate permeability and high available water capacity. Organic-matter content is moderately low or low and natural fertility is low or medium. Runoff is medium. These soils absorb moisture easily and release it readily to plants. They are easy to work.

Erosion by water is a severe hazard, especially when there is heavy rainfall immediately after these soils have been irrigated. Soil blowing is a hazard early in spring and late in fall when the soil is dry and cover is inadequate. Improving and maintaining the fertility and organic-matter content are concerns of management.

Small grains, alfalfa, and tame grass are suited to these soils under irrigation. Contour farming can help control erosion by water. Returning all crop residue to the soil and growing grass and legumes increases the organic-matter content and helps maintain fertility. Nitrogen and phosphorus generally are needed on these soils.

Only sprinkler irrigation is suited to these soils. Erosion in the wheel tracks can be a concern if center-pivot systems are used. The intake rate of these soils is moderate. The rate of application can be adjusted so that all of the water is absorbed by the soil.

CAPABILITY UNIT IVe-8 IRRIGATED

This unit consists of deep, well-drained, gently sloping to moderately sloping soils on uplands. These soils are mostly moderately coarse textured, but in places the surface layer ranges from medium textured to coarse textured and in places the underlying material is coarse textured. Reaction in the surface layer is neutral.

Soils in this unit have moderately rapid permeability and moderate or high available water capacity. Organic-matter content is low to moderate and natural fertility is low or medium. Runoff is medium. These soils absorb moisture easily and release it readily to plants.

Soil blowing is the principal hazard where these soils are unprotected. The blowing sand can damage seedlings and young plants early in spring or late in fall. Unless irrigation water is applied when needed, these soils can be somewhat droughty. Erosion by water is a hazard. Improving and

maintaining the fertility and organic-matter content are concerns of management.

Close-sown crops such as oats, barley, alfalfa, and grass are suited to these soils. Leaving crop residue on the surface helps control soil blowing, especially during early spring when the hazard is most serious. Hay and pasture crops can be used to help control erosion by water. Adding commercial fertilizers and barnyard manure helps improve and maintain the fertility and organic-matter content.

Sprinkler irrigation is best suited to these soils. The intake rate is moderately high, but light and frequent applications of water are needed because of the low available moisture capacity of these soils.

CAPABILITY UNIT IVe-10 IRRIGATED

The only mapping unit in this capability unit is Hersh-Valentine loamy fine sands, 0 to 5 percent slopes. It consists of deep, nearly level to undulating soils on uplands. These soils are well drained to excessively drained. They have a coarse-textured surface layer. Some of these soils have a moderately coarse textured transition layer. The underlying material is moderately coarse textured or coarse textured. Reaction in the surface layer is neutral.

Soils in this unit have moderately rapid to rapid permeability and low to high available water capacity. Organic-matter content is very low to low and natural fertility is low. Runoff is slow or very slow. These soils absorb moisture easily and release it readily to plants. They are difficult to work, particularly when dry, because the consistence is loose. Tilth is poor.

Soil blowing is a severe hazard, especially early in spring and late in fall when the surface is dry. These soils tend to be droughty and need a high level of management to grow crops successfully under irrigation. Fertility and organic-matter content need to be improved and maintained.

All of the crops commonly irrigated in Lincoln County are suited to these soils, but high residue crops such as corn and grain sorghum and close-sown crops such as small grains and alfalfa are best suited. Soil blowing can be reduced by using a system of stripcropping that alternates high residue crops and low residue crops, by leaving cover on the surface of the soil, and by using crop residue as mulch during seedbed preparation. Returning crop residue to the soil improves the organic-matter content. Commercial fertilizers can supply the nitrogen and phosphorus needed to improve the fertility of these soils.

Sprinkler irrigation is best suited to these soils. Because the intake rate is high, applications of water can be at a greater rate than on most soils in the county.

CAPABILITY UNIT IVe-11 IRRIGATED

This unit consists of deep, nearly level to moderately sloping soils on bottom lands and uplands. These soils are well drained to excessively drained. They have a loamy fine sand surface layer and are coarse textured throughout their profiles, except in a few places where the underlying material is moderately fine textured to coarse textured. Reaction in the surface layer is neutral to moderately alkaline.

Soils in this unit generally have rapid permeability, but in a few places the underlying material is moderately permeable. Available water capacity is low, organic-matter content is low, and natural fertility is low or medium. Runoff is slow to very slow. These soils absorb nearly all of the moisture they receive and release it readily to plants. They are somewhat difficult to work, particularly when dry, because the consistence is soft or loose. Tilth is poor.

Soil blowing is a severe hazard in cultivated areas. Because of their low available water capacity, these soils are droughty. Their coarse texture, low fertility, and low organic-matter content are severe limitations and careful management is needed to grow irrigated crops successfully.

Crops that leave a high amount of residue are best suited to these soils, but all of the crops commonly irrigated in Lincoln County can be grown. Soil blowing can be reduced by using a system of stripcropping that alternates high residue crops and low residue crops, by leaving cover on the surface of the soil, and by using crop residue as mulch during seedbed preparation. Adding commercial fertilizers and barnyard manures improves the fertility and organic-matter content.

Sprinkler irrigation, especially the center-pivot type, is particularly well suited to these soils. Because the intake rate is very high, applications of water can be at a greater rate than on most soils in the county.

CAPABILITY UNIT IVw-11 IRRIGATED

This unit consists of deep, somewhat poorly drained, nearly level to gently sloping soils on bottom lands. These soils have a moderately coarse textured to coarse-textured surface layer and a coarse-textured transition layer. The underlying material is medium textured to coarse textured. Reaction in the surface layer is moderately alkaline.

Soils in this unit have rapid permeability and low available water capacity. Organic-matter content is low and natural fertility is medium. Runoff is slow. These soils are somewhat difficult to work when dry. Tilth is poor.

Excessive wetness is the principal hazard. Because these soils warm up and dry out slowly in the spring, tilling and planting are delayed. Soil blowing is a hazard in the fall if the surface is not protected. Improving and maintaining the organic-matter content and fertility are concerns of management.

Corn, sorghum, alfalfa, and other crops that can be planted late in spring are best suited to these soils, but all of the crops commonly irrigated in Lincoln County can be grown. Crop residue should be left on the surface of the soil and can be used as mulch during and after seedbed preparation. Suitable outlets for drainage systems to remove excess water commonly are not available. Adding commercial fertilizers and barnyard manure helps to improve and maintain the fertility and organic-matter content.

Only sprinkler systems are suited to these soils. The intake rate is very high. Because these soils tend to be excessively wet during early spring and summer, irrigation is needed only during the middle and late summer months, when the water table generally is at its lowest level.

CAPABILITY UNIT IVw-13 IRRIGATED

Platte-Alda complex is the only mapping unit in this capability unit. It consists of nearly level to very gently sloping, somewhat poorly drained soils on bottom lands. These soils are shallow to moderately deep over mixed sand and gravel. They have a moderately fine textured to moderately coarse textured surface layer and a moderately fine textured to moderately coarse textured transition layer. The underlying material is medium textured to moderately coarse textured in the upper part. Depth to coarse sand and gravel

ranges from 10 to 40 inches. Reaction in the surface layer is moderately alkaline.

Permeability is moderately rapid in the upper part of the soils in this unit and is very rapid in the coarse sand and gravel. Available water capacity is very low to low, organic-matter content is low to moderate, and natural fertility is low or medium. Runoff is slow and is mainly in poorly defined natural drains. These soils absorb moisture easily and release it readily to plants. They are somewhat difficult to work because they commonly are wet in the lower areas and have loose consistence in other areas.

Excessive wetness is the principal hazard. Tillage and the planting of some crops is delayed in the spring, because these soils warm up and dry out slowly. When the water table is at its lowest level, generally late in summer, some of these soils become droughty. The shallow depth and low available water capacity, fertility, and organic-matter content are limitations. A high level of management is needed for the production of irrigated crops.

All of the irrigated crops commonly grown in Lincoln County are marginally suited to these soils. Many areas are in native grass that is harvested for hay. Returning all crop residue to the soil helps improve and maintain the organic-matter content. Adding commercial fertilizers and barnyard manure improves the fertility. If the shallow soils are leveled, care should be taken not to expose the sand and gravel. Suitable outlets for installing drainage systems generally are not available.

Sprinkler irrigation is best suited to these soils. It generally is needed only in late summer and fall, when the water table is generally at its lowest level.

CAPABILITY UNIT IVs-2 IRRIGATED

Silver Creek silt loam, saline-alkali, is the only soil in this capability unit. This is a deep, nearly level, somewhat poorly drained soil on bottom lands. It has a medium-textured surface layer and a moderately fine textured to fine-textured subsoil. The underlying material is coarse textured. Reaction in the surface layer is moderately alkaline to very strongly alkaline. Salinity is moderate to a depth of 30 inches.

This soil has slow permeability and moderate available water capacity. Organic-matter content is moderate and natural fertility is high. Runoff is slow. In many places the soil is plastic when wet and tends to become hard when dry. This soil is difficult to work because of the high alkalinity in the surface layer. Tilth is poorest in areas where the alkalinity is highest.

High alkalinity and excessive salinity in the rooting zone are the principal limitations. Wetness resulting from a water table at a depth of 2 to 5 feet is a hazard. Because this soil dries out and warms up slowly in the spring, seedbed preparation and planting are delayed. Establishing adequate drainage and improving the organic-matter content are concerns of management.

Sugar beets, tall wheatgrass, and other crops that are tolerant of the alkalinity and salinity are suited to this soil. Adding crop residue to the soil improves the organic-matter content and tilth. It also increases the intake rate and allows water to leach the alkalinity to lower depths. Wetness and alkalinity can be reduced by installing ditches or tile drains where suitable outlets are available.

Furrow or border irrigation systems are best suited to this soil. Because of the low intake rate, sprinkler irrigation is not suited.

CAPABILITY UNIT IVs-4 IRRIGATED

Lawet-Slickspot complex is the only mapping unit in this capability unit. This complex is on bottom lands and is deep, nearly level, and somewhat poorly drained. The Lawet soils have a medium-textured surface layer, a medium-textured transition layer, and moderately fine textured to coarse-textured underlying material. Slickspots have a medium textured to moderately coarse textured surface layer and medium textured to moderately fine textured subsoil and underlying material. Reaction in the surface layer is strongly alkaline to very strongly alkaline.

Soil materials in this unit have moderate or slow permeability and high available water capacity. Organic-matter content is moderate and natural fertility is medium. Runoff is slow to very slow. Moisture is absorbed and released slowly in most places. Water movement is restricted by the sodium and clay content in the highly alkaline slickspot areas. Slickspots are not easily worked because they remain wet for long periods of time. When they become dry after tillage, they are hard and cloddy. Tilth is poor.

Excessive alkalinity limits the uptake and availability of plant nutrients. Wetness is a hazard in most areas. Improving the organic-matter content and fertility is a concern of management.

Tall wheatgrass, sugar beets, and other alkali and salt tolerant crops are suited to this soil. Other crops can be grown provided acid-producing chemicals such as sulphur and gypsum are applied to reduce the alkalinity. In places, however, it is more economical and generally satisfactory to grow crops that are resistant to the saline-alkaline conditions than to attempt reclamation of the soil by applying chemicals. Careful consideration needs to be undertaken before expending large amounts of capital on such reclamation. Returning crop residue to the soil and adding barnyard manure will improve tilth, increase the moisture intake, and increase the fertility and organic-matter content.

Sprinkler irrigation and furrow and border systems are suited to this soil material. The intake rate is moderately low.

Predicted yields

Crop yield predictions are an important interpretation that can be made in a soil survey. Predicted annual yields per acre for the principal crops grown on soils of Lincoln County are given in table 2. These predictions are based on average yields during the period 1967–72 and do not represent yields that might be obtained in later years under new technology.

Yields for various crops were determined from yields records and other pertinent information obtained by interviewing farmers, directors of the Natural Resources District, representatives of the Soil Conservation Service and Agricultural Extension Service, and others familiar with the soils and agriculture in the county. Information from the Agriculture Stabilization and Conservation Service and research data from agricultural experiment stations also were used.

Crop production is influenced by many factors. Soil features such as depth, texture, slope, and drainage strongly affect crop yields; erodibility, available water capacity, permeability, and fertility also are important. Additional factors affecting yields are the cropping pattern, timeliness of operations, plant population, crop variety, and daily, seasonal, and annual fluctuations in the weather.

The yields given in table 2 are those expected under a high level of management as practiced by some farmers in the county; they do not apply to specific farms or farmers.

TABLE 2.—*Predicted average annual yields per acre of principal crops*

[Yields are for a high level of management. Dashed lines indicate the crop is not suited to the soil or is grown only in small amounts. Mapping units Bo, CoE, CoF, CzE, DbF, Ga, HfF, Le, Lo, Ma, Mu, Pa, Ra, Rb, UeE, VaE, VbE, VcF, and Wx are not included in this table because they are not suited to crops]

Mapping unit	Corn		Alfalfa hay		Grain sorghum		Dryland wheat [1]	Irrigated tame pasture [2]
	Dryland	Irrigated	Dryland	Irrigated	Dryland	Irrigated		
	Bushels	*Bushels*	*Tons*	*Tons*	*Bushels*	*Bushels*	*Bushels*	*AUM* [3]
Alda soils	35	100	3.0	5.0	42	95	---	---
Anselmo sandy loam, terrace, 0 to 3 percent slopes	40	125	2.0	5.0	38	95	34	9.0
Anselmo sandy loam, terrace, 3 to 5 percent slopes	35	115	1.5	4.5	35	90	30	8.5
Anselmo fine sandy loam, 0 to 3 percent slopes	45	125	2.0	5.0	45	95	34	9.0
Anselmo fine sandy loam, 3 to 5 percent slopes	35	110	1.5	4.5	30	90	32	8.5
Anselmo fine sandy loam, 5 to 9 percent slopes	---	---	---	---	---	---	---	8.0
Bankard loamy fine sand, loamy subsoil variant	35	90	2.5	4.5	30	70	---	8.0
Caruso loam	---	135	3.0	5.5	---	115	---	10.0
Cass fine sandy loam, 0 to 3 percent slopes	45	125	2.5	5.5	40	100	---	9.0
Cass fine sandy loam, calcareous variant	40	120	3.0	5.5	40	100	---	---
Coly silt loam, 7 to 9 percent slopes	20	---	1.5	3.0	25	---	20	---
Cozad silt loam, 0 to 1 percent slopes	45	145	3.0	6.0	50	120	40	11.0
Cozad silt loam, 1 to 3 percent slopes	40	135	2.5	5.5	45	110	37	10.0
Cozad silt loam, 3 to 7 percent slopes	35	120	2.2	4.8	40	90	30	9.0
Cozad silt loam, saline-alkali	30	90	2.0	4.0	35	70	---	7.5
Cozad silt loam, wet	65	130	3.5	6.0	70	110	---	---
Cozad silty clay loam	45	145	3.0	6.0	50	120	40	11.0
Cozad loam, sandy subsoil variant	40	130	2.5	5.5	40	90	37	10.0
Dunday loamy fine sand, 0 to 3 percent slopes	35	110	2.0	4.5	30	90	27	8.0
Dunday-Valentine loamy fine sands, 0 to 5 percent slopes	---	90	---	3.5	---	---	---	7.5
Elsmere loamy fine sand, 0 to 3 percent slopes	35	100	2.8	4.5	35	70	---	---
Elsmere complex, 0 to 5 percent slopes	25	85	---	3.5	---	65	---	---
Fillmore complex	35	105	2.5	4.5	45	80	30	---
Hall silt loam, 0 to 1 percent slopes	42	145	2.5	5.0	50	120	40	11.0
Hall silt loam, 1 to 3 percent slopes	38	140	2.0	5.5	45	115	39	10.5
Hall silt loam, terrace	45	145	3.2	6.0	50	120	40	11.0
Hersh-Anselmo fine sandy loams, 1 to 3 percent slopes	40	120	2.0	4.5	35	90	30	9.0
Hersh-Valentine loamy fine sands, 0 to 5 percent slopes	30	100	1.5	4.0	30	80	---	8.0
Hersh soils, 3 to 5 percent slopes	35	90	1.5	4.3	35	85	27	8.5
Hersh soils, 5 to 9 percent slopes	28	---	1.0	4.0	25	70	23	8.0
Hersh and Valentine soils, 5 to 9 percent slopes	---	---	---	---	15	---	16	---
Hobbs fine sandy loam, 0 to 3 percent slopes	45	140	2.5	5.8	45	110	40	11.0
Hobbs fine sandy loam, 3 to 7 percent slopes	35	125	2.0	5.0	30	90	32	9.0
Hobbs silt loam, 0 to 1 percent slopes	45	145	3.0	6.0	50	120	40	10.0
Hobbs silt loam, 1 to 3 percent slopes	40	140	2.5	5.5	45	115	39	10.0
Hobbs silt loam, 3 to 7 percent slopes	35	120	2.0	4.5	35	95	36	9.0
Hobbs and McCook silt loams	40	140	2.5	5.5	40	110	---	10.0
Holdrege fine sandy loam, 0 to 3 percent slopes	40	130	2.0	5.0	40	110	35	10.5
Holdrege silt loam, 1 to 3 percent slopes	35	140	2.0	5.5	40	110	38	10.0
Holdrege silt loam, 3 to 7 percent slopes	30	125	1.5	4.5	35	95	33	9.0
Holdrege silt loam, 3 to 7 percent slopes, eroded	28	115	1.2	4.2	32	90	30	9.0
Holdrege complex, 3 to 7 percent slopes	40	90	1.5	4.0	30	85	27	9.0
Holdrege and Uly silt loams, 7 to 9 percent slopes	24	---	1.0	3.5	32	---	24	---
Hord fine sandy loam, 0 to 3 percent slopes	42	135	2.0	5.5	40	105	40	11.0
Hord silt loam, 0 to 1 percent slopes	45	145	2.5	6.0	50	120	40	10.0
Hord silt loam, 1 to 3 percent slopes	38	140	2.0	5.5	38	110	38	10.0
Hord silt loam, terrace, 0 to 1 percent slopes	46	145	3.0	6.0	52	120	40	11.0
Hord silt loam, terrace, 1 to 3 percent slopes	42	140	2.5	5.5	47	115	38	10.5
Humbarger loam, gravelly substratum	---	145	3.0	6.0	---	120	---	---
Inavale loamy fine sand	---	90	---	3.5	---	---	---	7.5
Lawet fine sandy loam, drained	40	95	3.5	5.0	45	75	---	---
Lawet silt loam	---	---	3.0	---	---	---	---	---
Lawet silt loam, drained	40	100	3.5	5.0	45	75	---	---
Lawet silt loam, saline-alkali	---	---	1.5	3.0	---	---	---	---
Lawet loam, gravelly subsoil variant	---	---	2.2	---	---	---	---	---
Lex loam	---	125	2.5	4.5	45	---	31	---
Lex loam, saline-alkali	---	---	2.0	---	35	---	20	---
McCook loam	40	140	3.0	6.0	60	120	40	10.0
McCook loam, saline-alkali	---	85	2.0	4.5	---	---	---	8.0
Scott soils	10	---	---	---	20	---	---	---
Silver Creek silt loam	38	125	2.5	5.0	40	100	32	---
Silver Creek silt loam, saline-alkali	---	---	1.0	3.0	---	---	---	---
Uly silt loam, 3 to 7 percent slopes, eroded	28	100	2.0	4.0	35	80	28	9.0
Uly silt loam, 7 to 9 percent slopes	23	---	---	---	30	---	26	---
Uly-Coly silt loams, 7 to 9 percent slopes	22	---	---	---	30	---	23	---
Valentine loamy fine sand, nearly level	---	100	---	3.5	---	75	---	7.0
Vetal fine sandy loam, loamy substratum, 0 to 3 percent slopes	45	130	2.0	5.0	45	100	35	9.0
Wann fine sandy loam	42	125	3.0	4.8	40	90	---	---
Wann fine sandy loam, saline-alkali	25	75	1.8	3.0	30	60	---	---
Wann loam	45	125	3.0	5.0	42	105	---	---

[1] Wheat is raised under a fallow system; yields are those obtained every 2 years.
[2] Includes mixture of orchard grass, bromegrass, and alfalfa.
[3] AUM, or animal-unit-month, is a term used to express the carrying capacity of pasture. It is the number of animal units, or 1,000 pounds of live weight, that can be grazed on an acre of pasture for 30 days without harm to the pasture.

Under such management, the soil is protected from deterioration and is used in accordance with its capacity. Fertility is maintained and fertilizer or lime is applied at rates indicated by soil tests and field experiments. Crop residue is returned to the soil to improve tilth and to maintain or increase the organic-matter content of the soil. Adapted varieties of seed are used and plant populations are optimum. Weeds, insects, and diseases are controlled effectively. Where soils are irrigated, water is applied only when needed and in proper amounts. Water erosion and soil blowing are controlled, and wet soils are drained. Tillage, seeding, and cultivation practices are timely and are adequate.

The results in table 2 can be best used to compare the productivity of one soil with another. Because of effects of weather, sudden infestations of insects, disease, or other unpredictable hazards, yields in any one year on a particular soil can vary considerably from the figures given. Improved technology in the future may make predictions in table 2 obsolete; the yield data should be updated when improved methods significantly increase production.

Management of the Soils for Range[3]

Rangeland makes up approximately 75 percent of the total agricultural acreage in Lincoln County. It is scattered throughout the county, but the greatest concentrations are in the sandhills in the northern and southwestern parts of the county and in the loess hills in the southeastern part of the county. Range generally is not suited for cultivation. The major soil associations in range are Valentine and Coly-Rough broken land, loess.

Native meadows in Lincoln County are mostly on bottomland soils in the Lawet-Elsmere-Wet alluvial soil association. Elsmere loamy fine sand, 0 to 3 percent slopes, and Wet alluvial land are used extensively for pasture. Valentine loamy fine sand, rolling, and Dunday loamy fine sand, 0 to 3 percent slopes—both in the Valentine soil association—are periodically used for pasture.

Raising livestock, mainly cows and calves, is the largest agricultural enterprise in the county. The calves are sold in the fall as feeders.

Maintenance and improvement practices

All range needs management to maintain and improve its condition. Proper grazing use, deferred grazing, and planned grazing systems are needed practices. Distribution of livestock in a pasture or range can be controlled by correctly locating fences, livestock water supplies, and salting facilities.

Reseeding of native grasses from wild harvest or seeding with improved strains can improve range conditions. Some acreages of Hersh and Valentine soils, 5 to 9 percent slopes, and Coly silt loam, 9 to 15 percent slopes, now are used for crops but are better suited to range. Seed mixtures generally consist mostly of big bluestem, sand bluestem, little bluestem, switchgrass, sideoats grama, blue grama, and sand lovegrass. No special care other than proper management of grazing is needed to maintain forage production.

Range sites and condition classes

Different kinds of rangeland produce different kinds and amounts of native grass. The rancher needs to know the different kinds of soil in his holding and the plants that each soil is capable of growing. Then he can manage the range to favor the growth of the best forage plants on each kind of land.

A range site is a distinctive kind of rangeland that produces a kind and amount of climax vegetation significantly different from that on other sites. A significant difference is one that is large enough to require different grazing use or management to maintain or improve the vegetation. *Climax* vegetation is the combination of plants that originally grew on a given site. The most productive combination of forage plants on a site generally is the climax type of vegetation.

Vegetation is altered by intensive grazing. Livestock graze selectively. They constantly seek the more palatable and nutritious plants. Climax plants react to grazing by decreasing or increasing in number. The *decreasers* are the plants that are the most heavily grazed and, consequently, are the first to be injured by overgrazing. The *increasers* either withstand grazing better or are less palatable to the livestock. They increase under grazing and replace the decreasers. However, if heavy grazing continues, the increasers eventually decrease and are replaced by invaders. *Invaders* are plants that are not in the original plant community and that begin growing when the decreasers and increasers have been weakened or diminished.

Range condition is the current state of the plant community compared to the climax vegetation. The condition class is *excellent* if 76 to 100 percent of the plant community consists of species that compose the climax vegetation, *good* if 51 to 75 percent, *fair* if 26 to 50 percent, and *poor* if 0 to 25 percent. This classification is used in describing the existing plant stand in range sites in relation to the potential plant stand. Changes in range condition are due mainly to the intensity of grazing and to drought.

Descriptions of range sites

The 15 range sites recognized in Lincoln County are described in the pages that follow. Given for each site is a brief description of the mapping units in the site and descriptions of the topography, the dominant vegetation when the site is in excellent condition, the dominant vegetation when it is in poor condition, and the annual forage production when the site is in excellent condition.

To determine which soils are in a given range site, the reader can refer to the "Guide to Mapping Units" (at the back of this survey), which indicates the range site for each mapping unit. Marsh is not assigned to a range site because this land type is not used for range.

WET LAND RANGE SITE

This site consists of deep, nearly level to very gently sloping soils and land types that are on bottom lands adjacent to the Platte River and Medicine Creek, along drainageways in the sandhills, and in low areas and depressions. These soils and land types are poorly drained to very poorly drained. They have a moderately fine textured to moderately coarse textured surface layer and a medium-textured to coarse-textured underlying material, which is mottled. The water table fluctuates between the surface and a depth of about 40 inches. Ponding occurs occasionally in places.

At least 65 percent of the climax plant cover is a mixture of prairie cordgrass, reedgrasses, and other decreaser grasses. The rest is other perennial grasses, grasslike plants, and forbs. Members of the sedge family are the principal increasers. When this site is in poor condition, the dominant

[3] By PETER N. JENSEN, range conservationist, Soil Conservation Service.

plants are Kentucky bluegrass, red clover, redtop, asters, dandelions, and small amounts of prairie cordgrass and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 5,000 pounds per acre in unfavorable years to 6,000 pounds in favorable years.

SUBIRRIGATED RANGE SITE

This site consists of nearly level to gently sloping soils on bottom lands and low stream terraces. These soils are deep to shallow over mixed sand and gravel. They have a moderately fine textured to coarse-textured surface layer. Some have a moderately fine textured to coarse-textured transition layer, and the others have a medium-textured to fine-textured subsoil. The underlying material ranges from coarse to fine in texture. The water table fluctuates between depths of 2 and 8 feet.

At least 75 percent of the climax plant cover is a mixture of big bluestem, indiangrass, switchgrass, little bluestem, prairie cordgrass, Canada wildrye, and other decreaser grasses. The rest is other perennial grasses and forbs. Kentucky bluegrass, green muhly, and members of the sedge family are the principal increasers. When the site is in poor condition, the dominant plants are Kentucky bluegrass, redtop, dandelion, western ragweed, blue verbena, foxtail barley, and small amounts of western wheatgrass and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 4,500 pounds per acre in unfavorable years to 5,500 pounds in favorable years.

SALINE SUBIRRIGATED RANGE SITE

This site consists of nearly level, somewhat poorly drained soils that are strongly alkaline to very strongly alkaline. These soils are deep or moderately deep over mixed sand and gravel on low terraces and bottom lands. They have a moderately fine textured to moderately coarse textured surface layer. Some have a medium-textured transition layer, and the others have a medium-textured to fine-textured subsoil. The underlying material ranges from fine to coarse in texture. The alkalinity and salinity in the rooting zone greatly affect the vegetation. The water table fluctuates between depths of 2 and 8 feet.

At least 80 percent of the climax plant cover is a mixture of alkali sacaton, switchgrass, indiangrass, slender wheatgrass, plains bluegrass, Canada wildrye, and other decreaser grasses. The rest is other perennial grasses and forbs. Inland saltgrass and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are inland saltgrass, blue grama, Kentucky bluegrass, dandelion, and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production ranges from 4,000 pounds per acre in unfavorable years to 5,000 pounds in favorable years.

SILTY OVERFLOW RANGE SITE

The only mapping unit in this site is Hobbs and McCook silt loams. It consists of deep, nearly level to very gently sloping soils on stream terraces and bottom lands in narrow upland drainageways. These soils are moderately well drained and are mainly medium textured. They have high to moderate available water capacity and moderate permeability. They receive runoff from adjacent soils at higher elevations.

At least 70 percent of the climax plant cover is a mixture of big bluestem, little bluestem, switchgrass, slender wheatgrass, Canada wildrye, and other decreaser grasses. The rest is other perennial grasses and forbs. Western wheatgrass, green muhly, Kentucky bluegrass, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are Kentucky bluegrass, western wheatgrass, and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 3,500 pounds per acre in unfavorable years to 4,500 pounds in favorable years.

SILTY LOWLAND RANGE SITE

This site consists of deep, nearly level to very gently sloping soils on high bottom lands, stream terraces, and uplands. These soils are well drained to moderately well drained. The surface layer is medium textured except in some areas where it is moderately fine textured and in a few others where it is moderately coarse textured. Some of these soils have a medium-textured to moderately fine textured transition layer, and the others have a medium-textured to moderately fine textured subsoil. The underlying material ranges from coarse to moderately fine in texture. In a few areas mixed sand and gravel is below a depth of 40 inches. Depth to the water table ranges from 4 to 15 feet beneath the bottom lands and stream terraces. Upland areas receive runoff from adjacent soils at higher elevations.

At least 70 percent of the climax plant cover is a mixture of big bluestem, little bluestem, switchgrass, Canada wildrye, and other decreaser grasses. The rest is other perennial grasses and forbs. Western wheatgrass, needleandthread, blue grama, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are Kentucky bluegrass, blue grama, western ragweed, and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 3,000 pounds per acre in unfavorable years to 4,500 pounds in favorable years.

SANDY LOWLAND RANGE SITE

This site consists of deep, nearly level to moderately steep soils on bottom lands. These soils are moderately well drained to excessively drained. They have a moderately coarse textured to coarse-textured surface layer and transition layer. The underlying material ranges from moderately fine to coarse in texture. Depth to the water table is 6 to 15 feet.

At least 45 percent of the climax plant cover is a mixture of sand bluestem, little bluestem, switchgrass, Canada wildrye, and other decreaser grasses. The rest is other perennial grasses and forbs. Prairie sandreed, blue grama, needleandthread, Scribner panicum, sand dropseed, cudweed sagewort, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are sand dropseed, blue grama, Scribner panicum, and western ragweed.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges

from 3,000 pounds per acre in unfavorable years to 4,000 pounds in favorable years.

CLAYEY OVERFLOW RANGE SITE

Fillmore complex is the only mapping unit in this site. It consists of deep, nearly level soils in upland depressions. These soils are poorly drained. They have a medium-textured surface layer and a fine-textured to moderately fine textured subsoil. The underlying material is medium to moderately fine in texture. These soils have very slow permeability. Ponding occurs when they receive runoff from adjacent soils at higher elevations.

At least 50 percent of the climax plant cover is a mixture of big bluestem, switchgrass, little bluestem, Canada wildrye, and other decreaser grasses. The rest is perennial grasses and forbs. Western wheatgrass, Kentucky bluegrass, blue grama, buffalograss, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are Kentucky bluegrass, blue grama, buffalograss, western ragweed, and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 2,500 pounds per acre in unfavorable years to 4,000 pounds in favorable years.

SALINE LOWLAND RANGE SITE

The moderately to strongly alkaline part of McCook loam, saline-alkali, is the only soil in this site. It is a deep, moderately well drained, nearly level soil on bottom lands. This soil is mainly medium textured. The vegetation is affected by the alkalinity and the accumulation of mixed salts in the rooting zone. Depth to the water table fluctuates from 4 to 6 feet.

At least 70 percent of the climax plant cover is a mixture of western wheatgrass, alkali sacaton, switchgrass, plains bluegrass, slender wheatgrass, and other decreaser grasses. The rest is other perennial grasses and forbs. Inland saltgrass, Kentucky bluegrass, and members of the sedge family are the principal increasers. When this site is in poor condition, inland saltgrass is the dominant plant.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 2,500 pounds per acre in unfavorable years to 3,500 pounds in favorable years.

SILTY RANGE SITE

This site consists of deep, nearly level to steep, well-drained soils on uplands and stream terraces. These soils have a moderately fine textured to moderately coarse textured surface layer. Some have a medium-textured transition layer, and the others have a moderately fine textured to medium-textured subsoil. The underlying material is medium to moderately coarse in texture. Permeability is moderate or moderately slow, except in places where it is moderately rapid in the underlying material. The available water capacity is high.

At least 65 percent of the climax plant cover is a mixture of big bluestem, little bluestem, sideoats grama, switchgrass, indiangrass, and other decreaser grasses. The rest is other perennial grasses and forbs. Blue grama, buffalograss, western wheatgrass, sand dropseed, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are blue grama, buffalograss, sand dropseed, and western ragweed.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 2,000 pounds per acre, air-dry weight, in unfavorable years to 3,500 pounds in favorable years.

SANDY RANGE SITE

This site consists of deep, nearly level to steep soils on uplands, foot slopes, and stream terraces. These soils are well drained to excessively drained. They have a moderately coarse textured to coarse-textured surface layer. Some have a medium-textured to coarse-textured transition layer, and the others have a moderately fine textured to coarse-textured subsoil. The underlying material ranges from moderately fine to coarse in texture. Depth to the water table is more than 10 feet.

At least 65 percent of the climax plant cover is a mixture of sand bluestem, little bluestem, switchgrass, sideoats grama, prairie junegrass, and other decreaser grasses. The rest is perennial grasses and forbs. Blue grama, needleandthread, prairie sandreed, sand dropseed, Scribner panicum, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are blue grama, Scribner panicum, sand dropseed, and western ragweed.

Where the site is in excellent range condition, the air-dry weight of the total annual production ranges from 1,500 pounds per acre in unfavorable years to 3,000 pounds in favorable years.

LIMY UPLAND RANGE SITE

This site consists of deep, moderately sloping to steep soils on uplands. These soils are well drained. The surface layer, transition layer, and underlying material are medium textured. These soils are limy. They have moderate permeability and high available water capacity.

At least 80 percent of the climax plant cover is a mixture of little bluestem, sideoats grama, big bluestem, switchgrass, plains muhly, western wheatgrass, and other decreaser grasses. The rest is other perennial grasses and forbs. Blue grama, hairy grama, buffalograss, sand dropseed, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are blue grama, Kentucky bluegrass, Scribner panicum, sand dropseed, western ragweed, and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production of herbage ranges from 1,500 pounds per acre in unfavorable years to 3,000 pounds in favorable years.

SANDS RANGE SITE

This site consists of deep, undulating to hilly soils and land types on sandy uplands. These soils and land types are excessively drained. They have a coarse-textured surface layer and underlying material. Depth to the water table is more than 10 feet.

At least 60 percent of the climax plant cover is a mixture of sand bluestem, switchgrass, sand lovegrass, prairie junegrass, Canada wildrye, and other decreaser grasses. The rest is other perennial grasses and forbs. Little bluestem, prairie sandreed, needleandthread, blue grama, Scribner panicum, sand dropseed, and sand paspalum are the principal increasers. When this site is in poor condition, the dominant plants are blue grama, hairy grama, sand dropseed, sand paspalum, Scribner panicum, and western ragweed.

Where the site is in excellent range condition, the air-dry

weight of the total annual production of herbage ranges from 1,500 pounds per acre in unfavorable years to 2,500 pounds in favorable years.

CHOPPY SANDS RANGE SITE

The hilly part of Valentine complex, hilly, is the only soil in this site. This is a deep, steep to very steep, excessively drained soil on sandy uplands. It is coarse textured throughout its profile. Depth to the water table is more than 10 feet.

At least 70 percent of the climax plant cover is a mixture of sand bluestem, switchgrass, sand lovegrass, blowoutgrass, and other decreaser grasses. The rest is other perennial grasses, forbs, and shrubs. Little bluestem, prairie sandreed, needleandthread, hairy grama, sand dropseed, Arkansas rose, small soapweed, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are grama, hairy grama, sandhill muhly, sand dropseed, and sand paspalum.

Where the site is in excellent range condition, the air-dry weight of the total annual production ranges from 1,500 pounds per acre in unfavorable years to 2,500 pounds in favorable years.

THIN LOESS RANGE SITE

Rough broken land, loess, is the only mapping unit in this site. It is a steep to very steep, excessively drained land type on uplands. The soil material is medium textured, limy, and moderately permeable.

At least 80 percent of the climax plant cover is a mixture of little bluestem, big bluestem, sideoats grama, prairie sandreed, plains muhly, needleandthread, western wheatgrass, and other decreaser grasses. The rest is other perennial grasses and forbs. Blue grama, sand dropseed, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are blue grama, sand dropseed, broom snakeweed, and various annuals.

Where the site is in excellent range condition, the air-dry weight of the total annual production ranges from 1,500 pounds per acre in unfavorable years to 2,250 pounds in favorable years.

SHALLOW TO GRAVEL RANGE SITE

Dix complex, 5 to 30 percent slopes, is the only mapping unit in this site. It is shallow over mixed sand and gravel and consists of excessively drained soils on gravelly uplands. The surface and transition layers range from medium to moderately coarse in texture. The underlying material is mixed coarse sand and gravel. Gravel is at the surface in places. Depth to the water table is more than 10 feet.

At least 65 percent of the climax plant cover is a mixture of sand bluestem, little bluestem, prairie sandreed, needleandthread, western wheatgrass, plains muhly, prairie junegrass, and other decreaser grasses. The rest is other perennial grasses and forbs. Blue grama, sand dropseed, cudweed sagewort, and members of the sedge family are the principal increasers. When this site is in poor condition, the dominant plants are sand dropseed, hairy grama, western ragweed, and members of the sedge family.

Where the site is in excellent range condition, the air-dry weight of the total annual production ranges from 1,000 pounds per acre in unfavorable years to 2,000 pounds in favorable years.

Management of the Soils for Woodland and Windbreaks[4]

Much of the woodland in Lincoln County is along the North Platte, South Platte, and Platte Rivers and their tributaries. This woodland occurs in narrow strips but occupies an extensive area. It is predominantly cottonwood. Other plants in these stands are eastern redcedar, American elm, green ash, boxelder, willows, Russian-olive, buffaloberry, and redosier dogwood. Native trees also grow on Rough broken land, loess, in the southeastern part of the county. These stands consist mostly of hackberry, green ash, smooth sumac, American plum, eastern redcedar, Rocky Mountain juniper, skunkbush sumac, western snowberry, and American elm. Native trees and shrubs contribute a great deal to the natural beauty and landscape in the county. They also provide food and cover for wildlife.

Early settlers in Lincoln County planted trees for protection from wind and snow, for shade, and to provide a source of fenceposts. Because of the scarcity of trees and occasional extreme weather, landowners have continued to plant trees in windbreaks to protect their buildings and livestock. If suitably located, windbreaks contribute to human comfort, reduce home heating costs, help control snow drifting, provide shelter for livestock (fig. 17), improve conditions for wildlife, and beautify the homesites and countryside. In urban areas, narrow windbreaks or screen plantings are used to slow windspeeds, to settle the dust, and to reduce the noise level.

Although trees are not easily established in Lincoln County, the observance of basic rules of tree culture can result in a high degree of tree survival. Healthy seedlings of adapted species properly planted in a well prepared soil site and carefully tended after planting can survive and grow well. Specific information on the design, establishment, and care of windbreaks is available from the Soil Conservation Service and from the Extension Service forester serving the county.

Windbreak suitability groups

The soils of Nebraska are classified into windbreak suitability groups according to characteristics that affect tree growth. Soils in any one group produce similar growth of equal survival capacity under normal weather conditions and with proper care. No soils in Lincoln County are in windbreak suitability group 9. To find the names of all the soils in any group, reference should be made to the "Guide to Mapping Units" at the back of this survey. Each of the windbreak suitability groups in the county is described in the following pages.

WINDBREAK SUITABILITY GROUP 1

This group consists of deep, nearly level to very gently sloping soils in upland swales and on bottom lands, foot slopes, and stream terraces. These soils are well drained or moderately well drained. They have a medium-textured surface layer. Some have a medium-textured subsoil, and the others have a moderately fine textured to moderately coarse textured transition layer. The underlying material ranges from moderately fine to moderately coarse in texture.

Windbreaks of adapted trees and shrubs have a good chance for survival and growth if weeds and grasses are controlled so that they do not compete excessively for the

[4] By JAMES W. CARR, JR., forester, Soil Conservation Service.

Figure 17.—**A 13-year old livestock-protection windbreak planted on Cozad silt loam. It consists of three rows of eastern redcedar, one row of Russian-olive, and three rows of ponderosa pine.**

available moisture. Cultivation between the tree rows and either hand hoeing or careful use of selected herbicides in the tree row can be used to eliminate undesirable weeds.

WINDBREAK SUITABILITY GROUP 2

This group consists of nearly level to gently sloping, somewhat poorly drained soils on bottom lands, low stream terraces, and foot slopes. These soils are deep to shallow over mixed sand and gravel. They have a moderately fine textured to coarse-textured surface layer. Some have a moderately fine textured to moderately coarse textured transition layer, and the others have a fine-textured to coarse-textured subsoil. The underlying material ranges from fine to coarse in texture. Depth to the water table fluctuates from 2 to 6 feet.

Windbreaks have a good chance for survival and growth if the trees and shrubs are species that tolerate occasional wetness. Establishment of seedlings can be difficult during wet years. The abundant and persistent herbaceous vegetation competes with the young trees and also makes it difficult to cultivate the soil between tree rows. If carefully used, selected herbicides help to control undesirable weeds and grasses in the tree row. Cultivation with conventional equipment can be used between the rows.

WINDBREAK SUITABILITY GROUP 3

This group consists of deep, nearly level to steep soils on uplands, foot slopes, stream terraces, and bottom lands. These soils are well drained to excessively drained. They have a moderately coarse textured to coarse-textured surface layer. Some have a medium-textured to coarse-textured transition layer, and the others have a moderately fine textured to coarse-textured subsoil. The underlying material ranges from moderately fine to coarse in texture.

Windbreaks of adapted trees or shrubs have a fair chance for survival and growth if not subjected to soil blowing and lack of adequate moisture. Soil blowing can be controlled by maintaining strips of sod or other vegetation between the rows. Only the soils in the tree rows need to be cultivated.

WINDBREAK SUITABILITY GROUP 4

This group consists of deep, well-drained, nearly level soils on uplands, foot slopes, and stream terraces. These soils have a moderately fine textured to medium-textured surface layer. Some have a medium-textured transition layer, and the others have a medium-textured to moderately fine textured subsoil. The underlying material is medium textured. Some soils in this group are eroded in places.

Windbreaks of adapted trees or shrubs have a good chance

for survival and fair growth if not subjected to drought or competition from weeds and grasses for the available moisture. Lack of sufficient moisture, due to rapid runoff, reduces the growth of trees on the steeper slopes. Erosion by water is a hazard where trees are planted on the gently sloping to steep areas. Windbreaks can be planted on the contour to conserve moisture. They can be irrigated to assure survival from severe drought. Hand hoeing or careful use of selected herbicides can be used to control undesirable weeds and grass in the tree rows. Cultivation with conventional farm equipment can be used between the rows.

WINDBREAK SUITABILITY GROUP 5

This group consists of deep, well-drained, moderately sloping to moderately steep soils on silty uplands. These soils are calcareous at or near the surface. The thin surface layer, transition layer, and underlying material are medium textured.

Windbreaks of adapted trees or shrubs have a fair to poor chance of survival and growth. Lack of adequate moisture, low fertility, and the calcareous condition of the soil are the principal limitations. Tree rows can be planted on the contour to help conserve moisture. Hand hoeing or careful use of selected herbicides will help control undesirable weeds in the tree rows. The effect of a calcareous soil condidition can be minimized by using only those species rated good or fair for this group in table 3.

WINDBREAK SUITABILITY GROUP 6

This group consists of deep to moderately deep, poorly drained soils on bottom lands and in shallow upland depressions. These soils are nearly level except in a few areas where they are very gently sloping. They have a medium-textured to coarse-textured surface layer. Some have a medium-textured transition layer, and the others have a fine-textured to moderately coarse textured, mottled subsoil. The mottled underlying material ranges from fine to coarse in texture. The water table fluctuates between the surface and a depth of 4 feet. Ponds form in upland depressions when water runs off adjacent soils at higher elevations.

Windbreaks have a fair chance for survival and growth if the trees or shrubs tolerate a high water table or flooding. Excessive wetness is the principal hazard and concern of management. Ditching or tiling can be used to lower the water if a suitable outlet is available.

WINDBREAK SUITABILITY GROUP 7

This group consists of deep, undulating to hilly soils on sandy uplands. These soils are well drained to excessively drained. They are mainly coarse textured but are moderately coarse textured in places. The surface layer is thin.

These soils provide a fair tree planting site with fair survival and growth of adapted species. Soil blowing and the lack of adequate moisture are the principal hazards. The soils are so loose that the trees cannot be successfully cultivated without increasing the danger of erosion. Where cultivated, young trees can be damaged during high winds and may be covered by the drifting sand. This hazard can be minimized, however, by planting the trees in a shallow furrow with no cultivation. Only conifers can be successfully used on these soils with this method of planting.

WINDBREAK SUITABILITY GROUP 8

This group consists of nearly level, moderately well drained to somewhat poorly drained soils on low stream terraces and bottom lands. These soils are deep to moderately deep over mixed sand and gravel and are moderately alkaline to very strongly alkaline, at least in part. The surface layer is medium textured to moderately coarse textured. Some of these soils have a medium-textured transition layer, and the others have a fine-textured to coarse-textured subsoil. The underlying material ranges from fine to coarse in texture. Depth to the water table ranges from 2 to 8 feet.

Windbreaks have a fair chance for growth and survival if the trees and shrubs are species that are tolerant of alkalinity and salinity. Root growth is impeded by the alkali layer, and the workability of these soils is a concern during wet years. Soil blowing can be a hazard during dry years in places. Surface drainage is important and can be achieved by land leveling. Where soil blowing is a problem, a cover crop can be established between the tree rows to protect the soil and seedlings.

WINDBREAK SUITABILITY GROUP 10

This group consists of soils and land types on bottom lands, gravelly uplands, sandy uplands, and silty uplands and in upland depressions. These soils and land types have an extremely wide range of soil characteristics. They are deep to shallow, nearly level to very steep, ponded to excessively drained, and fine textured to coarse textured.

The soil materials in this group generally are not suited to windbreaks. Some areas can be used as habitat for wildlife or for recreation. In places adapted kinds of trees and shrubs can be grown successfully if they are planted by hand and carefully tended.

Growth of trees in windbreaks

The rate of tree growth in a windbreak depends upon many factors. Fertility, available moisture, and direction and steepness of slope are soil properties that affect the growth rate. Spacing and arrangement of species within the windbreak also are important factors. Some kinds of trees, especially cottonwood, grow fast but tend to die young. Siberian elm and Russian-olive also grow rapidly and often are short-lived; furthermore, they are likely to spread where not wanted. Boxelder and mulberry commonly freeze back in severe winters. Green ash is susceptible to damage by borers.

The trees best suited to windbreaks in Lincoln County are eastern redcedar, ponderosa pine, Austrian pine, and Rocky Mountain juniper. These trees are high in survival and vigor compared to other kinds of trees. Because they hold their needles through the winter, they give maximum protection when it is most needed. Eastern redcedar can reach a height of 25 to 30 feet at maturity. Pines and adapted broadleaf trees grow slightly faster and are somewhat taller at maturity. Broadleaf trees best suited for windbreaks in the county are eastern cottonwood, green ash, honeylocust, Russian-olive and Siberian elm. Shrubs that are best suited are American plum, chokecherry, lilac, and skunkbush sumac.

Table 3 gives the suitability and estimated height at 20 years of age for several kinds of trees that commonly are planted on soils of the principal windbreak suitability groups. Ratings for suitability are based upon observations of the relative vigor and general condition of the trees. A rating of *good* indicates that leaves (or needles) are normal in color and growth, that only small amounts of deadwood occur within the live crowns of the trees, and that damage due to

TABLE 3.—*Suitability of selected trees and shrubs*

[Estimated heights not given for

Tree and shrub species	Windbreak suitability group 1		2		3	
	Suitability	Height	Suitability	Height	Suitability	Height
		Feet		*Feet*		*Feet*
Conifers:						
Austrian pine	Good	26	Fair	24	Good	25
Blue spruce	Good	20	Fair	18	Poor	
Eastern redcedar	Good	20	Good	16	Good	18
Ponderosa pine	Good	26	Poor		Good	25
Rocky Mountain juniper	Good	15	Fair	14	Good	16
Scotch pine	Good	24	Fair	22	Fair	24
Deciduous trees:						
Black walnut	Good	24	Poor		Poor	
Boxelder	Good	22	Good	18	Fair	18
Bur oak	Good	24	Poor		Fair	18
Eastern cottonwood	Good	50	Fair	55	Good	48
Golden willow	Fair	28	Good	25	Poor	
Green ash	Good	26	Fair	24	Good	22
Hackberry	Good	24	Fair	20	Fair	19
Honeylocust	Good	28	Good	22	Good	22
Russian mulberry	Good	20	Good	16	Fair	16
Russian-olive	Good	22	Poor		Fair	18
Siberian elm	Good	36	Fair	25	Good	32
White willow	Fair	28	Good	25	Poor	
Shrubs:						
American plum	Good	7	Fair	5	Good	6
Common chokecherry	Good	10	Good	8	Good	9
Honeysuckle	Good	8	Fair	6	Fair	5
Lilac	Good	6	Fair	5	Good	5
Peking cotoneaster	Good	6	Fair	4	Fair	5
Red-osier dogwood	Good	6	Good	6	Poor	
Silver buffaloberry	Fair	6	Good	6	Poor	
Skunkbush sumac	Good	7	Poor		Good	6
Western sandcherry	Fair	4	Poor		Good	4

[1] Suitability ratings and estimated heights are not given for Group 10 because soils of this group generally are not suited for windbreaks.

disease, insects, and climate is small; *fair* indicates either that leaves (or needles) are somewhat abnormal in color and growth, that substantial amounts of deadwood occur within the live crowns, that damage due to disease, insects, or climate is moderate, or that the current year's growth is obviously less than normal; and *poor* indicates either that leaves (or needles) are very abnormal in color and growth, that very large amounts of deadwood occur within the live crowns, that damage due to disease, insects, or climate is extensive, or that the current year's growth is almost negligible. Estimated heights are based on detailed measurements made by forestry technicians on most kinds of trees and shrubs in windbreaks that were approximately 20 years old.

Use of the Soils for Wildlife and Recreation[5]

Cover, food, and water are essential to the production and survival of wildlife. The kinds and number of wildlife that can be produced and maintained in an area are determined largely by the kinds, amount, and distribution of vegetation. The vegetation, in turn, is governed by soil characteristics such as topography, fertility, wetness, permeability, and available water capacity.

Topography affects wildlife through its influence on how land can be used. Steep slopes and rough, irregular areas are a hazard to livestock and are poorly suited to crop production. However, undisturbed vegetation on such land is valuable as a source of food and cover for some kinds of wildlife. Where such cover is lacking, it generally can be developed by planting flowering and fruiting trees and shrubs (such as oak, ash, honeylocust, autumn-olive, honeysuckle, and coralberry) or legumes and grasses (such as partridge pea, vetch, clover, alfalfa, big bluestem, little bluestem, switchgrass, indiangrass, and sideoats grama).

Fertile soils generally produce more food and better habitat for wildlife than infertile soils. Ponds that receive water drained from fertile soils usually produce more fish and other aquatic life. Zooplankton and phytoplankton, microscopic animals and plants produced in fertile ponds, provide food for the larger aquatic animals such as frogs which, in turn, are used as food by fish.

Wetness, permeability, and available water capacity are important considerations in the construction of ponds for fish and in maintaining wetland habitat for waterfowl.

[5] By ROBERT O. KOERNER, biologist, Soil Conservation Service.

(dryland) and estimated height attained in 20 years [1]

species having poor suitability rating]

Windbreak suitability group—Continued									
4		5		6		7		8	
Suitability	Height	Suitability	Height	Suitability	Height	Suitability	Height	Suitability	Height
	Feet		*Feet*		*Feet*		*Feet*		*Feet*
Good	22	Poor		Poor		Good	18	Poor	
Fair	16	Poor		Poor		Poor		Poor	
Good	17	Good	15	Poor		Good	14	Fair	9
Good	22	Fair	18	Poor		Good	18	Fair	14
Good	16	Good	15	Poor		Good	12	Good	10
Fair	20	Poor		Poor		Fair	16	Poor	
Poor		Poor		Poor		Poor		Poor	
Poor		Poor		Poor		Poor		Poor	
Fair	18	Good	15	Poor		Poor		Poor	
Poor		Poor		Fair	40	Poor		Good	38
Poor		Poor		Good	22	Poor		Poor	
Fair	21	Poor		Poor		Poor		Good	14
Fair	18	Poor		Poor		Poor		Poor	
Good	24	Fair	18	Poor		Poor		Good	15
Fair	15	Poor		Poor		Poor		Poor	
Good	18	Fair	16	Poor		Fair	16	Good	10
Good	30	Fair	22	Poor		Poor		Good	17
Poor		Poor		Good	22	Poor		Poor	
Good	6	Poor		Poor		Poor		Poor	
Good	8	Fair	5	Poor		Poor		Poor	
Good	6	Poor		Poor		Poor		Poor	
Good	6	Fair	5	Poor		Poor		Poor	
Poor		Poor		Poor		Poor		Poor	
Poor		Poor		Fair	5	Poor		Poor	
Poor		Poor		Fair	5	Poor		Good	5
Good	6	Good	5	Poor		Poor		Fair	4
Poor		Poor		Poor		Fair	4	Poor	

In table 4 the soils in Lincoln County are rated according to their potential to support the main kinds of wildlife habitat in the area.

Elements of wildlife habitat

Suitable habitat for various kinds of wildlife include different types of dryland vegetation, wetland vegetation, and shallow-water sites. These elements of habitat can be classified as follows:

Grain and seed crops (such as corn, sorghum, wheat, oats, barley, millet, soybeans, and sunflowers) are domestic grains or seed-producing annuals that produce food for wildlife.

Domestic grasses and legumes (such as fescue, bluegrass, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, and crownvetch) are perennial grasses and herbaceous legumes that provide food and cover for wildlife.

Wild herbaceous plants (such as bluestem, indiangrass, goldenrod, beggarweed, partridgepea, pokeweed, wheatgrasses, fescues, and gramas) are native or naturally established dryland grasses and forbs, including weeds, that provide food and cover for wildlife.

Hardwood trees and shrubs (such as cottonwood, willow, ash, boxelder, oak, Russian-olive, snowberry, and honeysuckle) are nonconiferous trees and associated woody understory plants that provide cover and shade or that produce nuts, berries, buds, catkins, twigs, bark, or foliage that can be used as food by wildlife.

Coniferous plants (such as pine, spruce, fir, cedar, and juniper) are cone-bearing trees, shrubs, or low growing vegetation that furnish cover or supply food in the form of browse, seeds, or fruitlike cones. These plants commonly are established through natural processes, but they can be planted or transplanted.

Wetland food and cover (such as smartweed, wild millet, rushes, sedges, reeds, cordgrass, and cattail) are annual and perennial wild herbaceous plants that grow on moist or wet sites. These plants are used extensively for food and cover by wetland forms of wildlife. Vegetation in this group does not include submerged or floating aquatics.

Shallow water areas (such as muskrat marshes, waterfowl feeding areas, wildlife watering developments, wildlife ponds, and beaver ponds) are sites where the surface water has an average depth of less than 5 feet. Such areas occur as natural marshes or ponds or they are created by the use of dams, levees, or water-control devices in marshes or streams.

TABLE 4.—*Potential of the principal soils in each soil association for producing elements*

Soil association and soil	Potential for producing—		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants
Valentine:			
Valentine	Poor	Fair	Fair
Hersh-Valentine-Anselmo:			
Hersh	Fair	Good	Good
Valentine	Fair to poor	Fair to good	Fair
Anselmo	Fair	Good	Good
Dix-Hersh-Creighton:			
Dix	Poor	Poor	Fair
Hersh	Fair	Good to fair	Good
Creighton	Poor	Fair	Good
Coly-Rough broken land, loess:			
Coly	Poor	Fair	Fair
Rough broken land, loess	Very poor	Very poor	Fair
Uly-Holdrege-Coly:			
Uly	Fair	Good	Good
Holdrege	Fair	Good	Good
Coly	Fair	Good to fair	Fair
Holdrege-Hord-Uly:			
Holdrege	Good	Good	Good
Hord	Good	Good	Good
Uly	Fair	Good	Good
Lawet-Elsmere-Wet alluvial land:			
Lawet	Fair to poor	Fair	Good
Elsmere	Poor	Fair	Good
Wet alluvial land	Very poor	Good [2]	Fair
Gravelly alluvial land-Platte-Riverwash:			
Gravelly alluvial land	Very poor	Very poor	Poor
Platte	Poor	Poor	Fair
Riverwash	Very poor	Very poor	Poor
Lawet-Wann-Lex:			
Lawet	Fair to poor	Fair	Good
Wann	Good	Good	Good
Lex	Fair	Fair	Good
Cozad-Hord:			
Cozad	Good	Good	Good
Hord	Good	Good	Good
Caruso-Silver Creek-Humbarger:			
Caruso	Good	Good	Good
Silver Creek	Fair	Good	Good
Humbarger	Good	Good	Good

[1] Good for cottonwood and willow.
[2] Good for grasses but poor for legumes.

Classes of wildlife

The various kinds of wildlife can be classified according to habitat. These classes are described in the following paragraphs.

Open land wildlife consists of birds and mammals that live in croplands, pastures, meadows, lawns, and areas overgrown with grasses, herbs, shrubs, or vines. Bobwhite quail, pheasant, meadowlark, killdeer, cottontail rabbit, red fox, and woodchuck are examples.

Woodland wildlife consists of birds and mammals that find food or cover in wooded areas containing either hardwood or coniferous trees and shrubs, or a mixture of both. Wild turkey, ruffed grouse, thrushes, vireos, woodpeckers, squirrels, gray fox, raccoon, and white-tailed deer are examples.

Wetland wildlife consists of birds and mammals indigenous to swampy, marshy, or open-water areas. Ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver are examples.

Rangeland wildlife consists of birds and mammals that obtain food or cover from native rangeland. Antelope, white-tailed deer, mule deer, lark bunting, meadowlark, and prairie dog are examples.

Some kinds of wildlife can be classified in more than one

of wildlife habitat and for producing habitat suitable for different classes of wildlife

Potential for producing—Continued				Potential for producing habitat for—			
Hardwood trees and shrubs	Coniferous plants	Wetland food and cover	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.
Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Fair	Very poor	Good.
Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor	Fair.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Good.
Fair	Fair	Very poor	Very poor	Fair	Poor	Very poor	Fair to good.
Poor	Fair	Very poor	Very poor	Poor	Fair	Very poor	Fair.
Good	Good	Very poor	Very poor	Good	Poor	Very poor	Good.
Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good.
Fair	Fair	Very poor	Very poor	Fair	Poor	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Fair	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Poor	Very poor	Good.
Fair [1]	Fair	Good	Good	Fair	Fair	Good	Good.
Fair [1]	Fair	Good	Good	Fair	Fair	Fair	Good.
Fair [1]	Poor	Fair	Good	Poor	Fair	Good	Fair.
Very poor	Very poor	Fair	Good	Very poor	Very poor	Fair	Poor.
Fair [1]	Fair	Fair	Good	Poor	Fair	Fair to good	Fair.
Poor [1]	Very poor	Fair	Good	Very poor	Poor	Good	Poor.
Fair [1]	Fair	Good	Good	Poor	Fair	Good	Good.
Fair [1]	Fair	Fair	Fair	Good	Fair	Fair	Good.
Fair [1]	Fair	Fair	Fair	Fair	Fair	Fair	Good.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.
Fair [1]	Fair	Fair	Fair	Fair	Poor	Fair	Good.
Good	Good	Very poor	Very poor	Good	Good	Very poor	Good.

group. For example, white-tailed deer find cover in woodland and food in woodland or on native range and thus can be considered as *woodland wildlife* and as *rangeland wildlife.*

Kinds of wildlife by soil association

Soils of Lincoln County provide suitable habitat for many species of game and nongame birds and animals. Potential for wildlife in the valleys of the South Platte, North Platte, and Platte Rivers is good, but the amount of wildlife on upland soil associations is limited by lack of cover. Table 4 shows the potential of the principal soils of each soil association for producing different kinds of habitat and their potential for producing different kinds of wildlife. However, because agricultural soils are managed intensively for maximum crop yields rather than for wildlife, soils having the highest potential for producing wildlife generally are not those that have the highest wildlife populations. Hunting also limits the production of some species. The relation of habitat and wildlife populations is discussed in the following paragraphs. Discussion pertains primarily to the game species and their habitat, although nongame species are becoming increasingly important.

Undulating and rolling areas alternating with steep and very steep hills characterize the Valentine association. The

sandy upland soils are primarily in native range and are covered with big bluestem, little bluestem, indiangrass, switchgrass, side-oats grama, and other grasses. Prairie grouse average 5 to 20 per square mile in the northern part of the association and less than 5 per square mile south of the Platte River. Antelope number less than 1 per square mile in the northern part of the association. Deer are concentrated primarily in the wooded areas along drainageways but also average less than 1 per square mile.

The Hersh-Valentine-Anselmo association consists of nearly level to steep, loamy and sandy soils on uplands. About 60 percent of the acreage is cultivated. A few scattered windbreaks have been planted around farmsteads. This association provides much good habitat for pheasant, especially in the area just east of the Sutherland Reservoir.

Soils in the Dix-Hersh-Creighton association are on gently sloping to steep uplands. This association provides nesting for grouse and pheasant and supports an active prairie dog town.

The second largest association in the county, Coly-Rough broken land, loess, consists of moderately sloping to very steep, silty soils on uplands. It is dissected by many deep finger gullies having flat valley floors. Scattered clumps of deciduous trees and shrubs, such as hackberry, native plum, and smooth sumac, grow on the east-facing slopes. Volunteer redcedar trees grow along the drainageways. This association provides excellent habitat for cottontail rabbit, which number approximately 100 to 300 per square mile, and for whitetail deer, mule deer, and prairie grouse.

Much of the acreage on the long, smooth upland slopes of the Uly-Holdrege-Coly association is cultivated. The rest is in native range. The grain provides food and the grassland provides cover for game such as prairie grouse and pheasant, which are available for hunting.

The nearly level to moderately sloping, silty upland soils of the Holdrege-Hord-Uly association provide good habitat for pheasant.

The Lawet-Elsmere-Wet alluvial land association is a transitional area between the sandhills and the bottom lands of the North Platte River valley. Characterized by nearly level to gently sloping soils and a seasonal high water table, this association is mostly hayland. The grassy areas provide nesting for waterfowl, pheasant, and grouse. Early in spring migrating waterfowl and shore birds find food and cover in this association. Large flocks of sandhills cranes, which use an area near Hershey as a rest stop and staging area during their spring migration, have become an annual tourist attraction. Because of the high water table, a potential exists for excavated ponds.

Channels of the Platte River and land along the river make up the Gravelly alluvial land-Platte-Riverwash association. Soils in this association are at a relatively low elevation and are nearly level to gently sloping. Woodland, native grasses, and adjacent croplands provide food and cover for many kinds of wildlife. Sometime during the year, this association probably is visited by each wildlife species that is native to Lincoln County. Deer populations average more than 8 per square mile, wild turkeys number 1 to 3 per square mile, and mourning doves, songbirds, and other nongame species are numerous.

The Lawet-Wann-Lex association consists of nearly level soils that are subject to occasional flooding. Depth to the water table fluctuates from about 2 to 6 feet. This association provides habitat for wetland wildlife. Cottonwood, elm, redcedar, and willow trees provide food and cover for tree-loving wildlife such as squirrel, bobcat, and raccoon.

Most of the acreage in the Cozad-Hord association and in the Caruso-Silver Creek-Humbarger association is cultivated and some is irrigated. Corn, milo, and alfalfa are the main crops. These associations are near or adjacent to channels of the South Platte, North Platte, and Platte Rivers. They provide a readily available food supply, water, and cover for many kinds of wildlife.

Plans for the optimum use of both rural and urban areas should include wildlife management programs. Conditions for the production and maintenance of wildlife species can be improved with little cost and effort. In Lincoln County, lack of cover on soils that are cultivated or in range is the primary factor limiting the amount of wildlife. Planting uncultivated areas to woody and herbaceous plants can increase and improve the cover for wildlife. Technical assistance for designing and installing measures to improve wildlife habitat is available from the Soil Conservation Service, which has a field office at North Platte, and also from other federal and state agencies.

Recreation

Hunting and fishing are the principal recreational pursuits in Lincoln County, although water sports, picnicking, camping, and bird watching are enjoyed by many.

Several areas in the county are used for recreation. The Sutherland Reservoir south of Sutherland, the North Platte regulating reservoir south of North Platte, the Jeffrey Reservoir and special use area south of Brady, and areas along channels of the rivers offer opportunities for recreation. The Nebraska Game and Parks Commission maintains the Hansen Memorial Reserve, the Wellfleet special use area, and other special use areas in the southern part of the county. Several rest areas have been established along Interstate Highway 80 for use by tourists.

Streams, reservoirs, and ponds in Lincoln County provide suitable habitat for fish. In the Platte River are northern pike, catfish, carp, suckers, and panfish. Birdwood Creek and the Hershey drainageways are stocked periodically with brown trout and rainbow trout. Fishing in other streams in the county is limited to Medicine and Red Willow Creeks, which are small headwater tributaries of the Republican River. The Sutherland and North Platte Reservoirs and other regulatory impoundments for irrigation water and power installations offer fair fishing. However, water-level fluctuations and rough fish in the reservoirs limit the production of game fish. Farm ponds offer fair fishing. Many contain over-abundant populations of sunfish and bullhead. Excessive seepage occurs in the porous and single-grained soils and is a limiting factor in controlling fish populations. The quality of warm water fishing in farm ponds could be improved if the ponds were under better management.

Technical assistance for designing and installing facilities for recreation in Lincoln County are available from the Soil Conservation Service office at North Platte and from other federal and state agencies.

Engineering Uses of the Soils[6]

Information about soils used as structural material or as foundations upon which structures are built is of special

[6] SYDNEY H. HAAKENSTAD and ROBERT J. FREDRICKSON, engineers, Soil Conservation Service, assisted in preparation of this section.

interest to engineers, contractors, planning commissions, town and city managers, land developers, and farmers. Among properties of soils highly important in engineering are permeability, shear strength, compaction characteristics, drainage, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and slope of the soil. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Several estimated soil properties significant to engineering and interpretations for various engineering uses are given in tables 5 and 6, respectively, for all soils in Lincoln County. Table 7 gives engineering properties determined by laboratory tests for samples from nine soil profiles. Estimates and interpretations in these tables can be helpful to those who—

1. Select potential residential, industrial, commercial, or recreational areas;
2. Evaluate alternate routes for roads, highways, pipelines, or underground cables;
3. Seek sources of gravel, sand, or clay;
4. Plan farm drainage systems, irrigation systems, ponds, terraces, or other structures for controlling water and conserving soil;
5. Correlate performance of engineering structures already built with the properties of the soils on which they are built, and then develop information for predicting performance of structures on the same or similar kinds of soils in other locations;
6. Predict the suitability of soils for cross-country movement of vehicles or construction equipment; and
7. Develop preliminary estimates pertinent to construction in a particular area.

The engineering interpretations in this section, used in conjunction with the soil map and other parts of the survey, serve many useful purposes. It should be emphasized, however, that they do not eliminate the need for detailed field investigations at sites for specific engineering works. Sampling and testing are particularly important where construction involves heavy loads or excavations deeper than those shown in the tables, generally about 5 feet. Also, inspection of sites, especially the smaller ones, is needed because delineated areas of many soil mapping units contain small areas of other soils that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have different meanings in soil science than in engineering. These terms are defined in the Glossary as they are used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying soils for engineering purposes are the Unified system (*2*) and the AASHTO system (*1*). The former is used by Soil Conservation Service engineers, the Department of Defense, and others. The latter was developed and adopted by the American Association of State Highway and Transportation Officials. Estimated classifications of all the soils in Lincoln County according to these two systems and according to the textural classification used by the U.S. Department of Agriculture (USDA) (*5*) are given in table 5.

The Unified system is used to classify soils according to their engineering uses for building material or for support of structures other than highways. It is based on the texture, plasticity, and performance of the soils. Each classification consists of two letters that represent the principal characteristics of the soil. The first letter indicates whether the soil is coarse grained, fine grained, or organic (or peat). The coarse-grained soils are gravel, G, and sand, S. These are further classified primarily by gradation: W for well graded and P for poorly graded; for example, SP is a sand, poorly graded. The fine-grained soils are silt, M, and clay, C. These are further classified according to plasticity characteristics: L for low liquid limit and H for high liquid limit; therefore, CL is a clay of low plasticity. Organic soils, O, and peat, Pt, are classified according to odor and to plasticity changes after oven-drying. Soils that have borderline characteristics of two classifications are given a dual classification; the classification indicating the predominant characteristics is given first.

The AASHTO system is used to classify soils according to those properties that affect their use in highway construction and maintenance. It is based on field performance. In this system soil materials are placed in seven groups, ranging from A-1 (soils that have a high bearing capacity) to A-7 (soils that have a low bearing capacity when wet). A-1, A-2, and A-3 soils are predominantly sand and gravel mixtures, and A-4 through A-7 soils are mostly silt and clay mixtures. A sand-silt-clay soil is further classified by identifying the silt-clay portion. Thus, an A-2-4 soil is an A-2 sand with an A-4 type of silt-clay mixture included. The relative engineering value of each soil within the group is indicated by a group index number, which is shown in parentheses after the soil group. (See table 7.) Group index numbers range from 0 for the best material to 20 for the poorest. Table 5 gives estimated AASHTO classifications, without group index numbers, for all soils in Lincoln County.

Many soil scientists use the USDA textural classification. In this system, the texture of the soil material is determined according to the proportion of sand, silt, and clay in the part of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is used in the classification. "Gravelly loamy sand," for example, is sand interspersed with some clay, silt, and gravel. "Sand," "silt," "clay," and other terms used in the USDA classification are defined in the Glossary at the back of this survey.

Soil properties significant to engineering

Several estimated soil properties significant to engineering are given in table 5. These estimates, listed by layers that have significantly different soil properties, are based on field observations made in the course of mapping, on test data for these and similar soils, and on information available about the same kinds of soil in other counties.

For each soil, table 5 gives the depth to the seasonal high water table—that is, the distance from the surface of the soil to the highest level that ground water reaches during most years. The USDA textural classification and the Unified and AASHTO classifications are given for each layer. The depth to bedrock is not given, because bedrock is at a depth of 5 feet or more throughout Lincoln County, except in a few small areas. Creighton soils are the only soils in the county that formed in material weathered from bedrock. Mapped

TABLE 5.—*Estimates of soil*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such the other series that appear in the first column of this table.

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	USDA texture	Classification	
				Unified	AASHTO
	Feet	*Inches*			
Alda: Ad	2–4	0–13	Loam	SM or ML–CL	A–4
		13–30	Fine sandy loam and loamy fine sand.	SM or ML	A–2 or A–4
		30–60	Mixed sand and gravel	SP or SP–SM	A–3 or A–1
Anselmo: AfB, AfC, AnB, AnC, AnD	>10	0–15	Fine sandy loam	SM, SM–SC, or ML	A–4
		15–32	Fine sandy loam	SM, SM–SC, or ML	A–4
		32–60	Loamy fine sand	SM, or SM–SC	A–2 or A–4
Bankard variant: Bk	6–10	0–10	Loamy fine sand	SM	A–2
		10–28	Stratified loamy fine sand, fine sandy loam, sand and gravel.	(2)	(2)
		28–58	Silty clay loam	CL	A–6 or A–7
		58–60	Gravelly loam	SM or SC	A–4
Blown-out land: Bo	>10	0–60	Fine sand	SP or SP–SM	A–3
Caruso: Cb	5–7	0–10	Loam	ML, CL–ML, or CL	A–4
		10–36	Clay loam	CL	A–6 or A–7
		36–41	Sandy loam	SM, ML–CL, or SC	A–4
		41–60	Loamy sand and sand	SP–SM or SM	A–2 or A–3
Cass: CeB	7–12	0–19	Fine sandy loam or sandy loam	SM or ML–CL	A–4
		19–36	Sandy loam or loamy sand	SM	A–4
		36–60	Sand or fine sandy loam	SP–SM or SM	A–2 or A–3
Cass variant: Cf	5–8	0–13	Fine sandy loam	SM or ML	A–4
		13–39	Sandy loam or loamy fine sand	SM or ML	A–2 or A–4
		39–56	Loam or silty clay loam	CL or ML–CL	A–4 or A–6
		56–60	Fine sandy loam	SM or ML	A–4
Coly: CoD, CoE, CoF	>10	0–13	Silt loam	CL or ML–CL	A–4 or A–6
		13–60	Silt loam	CL or ML–CL	A–6 or A–4
Cozad:					
CsA, CsB, CsC, Cu	[3] >10	0–11	Silt loam	ML or ML–CL	A–4 or A–6
		11–15	Silt loam	CL–ML or ML	A–6 or A–4
		15–60	Very fine sandy loam	ML or ML–CL	A–4
Ct	2–6	0–11	Silt loam	ML or ML–CL	A–4 or A–6
		11–15	Silt loam	ML	A–6 or A–4
		15–60	Very fine sandy loam	ML	A–4
Cv	>10	0–8	Silty clay loam	ML or CL	A–6 or A–4
		8–15	Silt loam	ML	A–6 or A–4
		15–60	Very fine sandy loam	ML	A–4
Cozad variant: Cx	>10	0–13	Loam	ML	A–4
		13–32	Very fine sandy loam	ML	A–4
		32–60	Fine sandy loam	ML or SM	A–4
Creighton: CzE	>10	0–8	Loam	ML or ML–CL	A–4
		8–16	Loam	ML or ML–CL	A–4
		16–60	Loam	ML	A–4
Dix: DbF	>10	0–8	Sandy loam	SM or ML	A–4
		8–16	Gravelly sandy loam	SM	A–2 or A–4
		16–60	Sand and gravel	SP	A–1
*Dunday: DuB, DvC. For Valentine part of unit DvC, see unit VbB of Valentine series.	>10	0–15	Loamy fine sand	SM	A–2 or A–4
		15–21	Loamy fine sand	SM	A–2 or A–4
		21–60	Loamy fine sand	SM	A–2
Elsmere: EaB, ExC	2–4	0–14	Loamy fine sand	SM	A–2 or A–4
		14–60	Fine sand	SP–SM or SM	A–2 or A–3

properties significant in engineering

mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to Symbol > means more than, symbol < means less than]

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)						
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*	
	100	70–95	40–75	0–25	0–5	0.6–2.0	0.20–0.22	7.9–8.4	Low.
	100	65–95	15–55	[1]	[1]	2.0–20.0	0.09–0.17	7.4–8.4	Low.
90–100	85–95	40–70	0–10	[1]	[1]	>20	0.02–0.04	6.6–7.8	Low.
	100	90–100	45–55	20–30	0–10	2.0–6.0	0.16–0.18	6.6–7.3	Low.
	100	90–100	45–55	20–30	0–10	2.0–6.0	0.15–0.17	6.6–7.3	Low.
100	95–100	85–100	25–50	0–25	0–5	6.0–20.0	0.08–0.10	7.4–7.8	Low.
100	95–100	50–75	15–30	0–25	0–5	2.0–6.0	0.08–0.10	7.9–8.4	Low.
[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
100	95–100	90–100	85–95	30–45	15–25	0.6–2.0	0.18–0.20	7.9–8.4	Moderate.
95–100	75–85	55–65	40–50	0–25	0–10	0.6–2.0	0.17–0.19	7.4–7.8	Low.
	100	95–100	3–10	[1]	[1]	6.0–20.0	0.05–0.07	7.4–7.8	Low.
100	95–100	85–95	51–70	20–30	0–10	0.6–2.0	0.20–0.22	7.9–8.4	Low.
100	95–100	85–95	51–80	30–45	11–25	0.6–2.0	0.15–0.17	7.9–8.4	Moderate.
	100	80–95	40–60	0–30	0–10	2.0–6.0	0.11–0.13	7.9–8.4	Low.
	100	50–75	5–30	5–30	0–5	6.0–20.0	0.05–0.10	6.6–8.4	Low.
100	95–100	85–95	45–55	0–20	0–5	2.0–6.0	0.13–0.18	6.6–7.8	Low.
100	95–100	85–90	40–50	[1]	[1]	2.0–20.0	0.09–0.14	6.6–7.8	Low.
100	95–100	80–90	5–20	[1]	[1]	2.0–20.0	0.05–0.16	6.6–7.8	Low.
	100	90–100	45–55	20–30	0–5	2.0–6.0	0.16–0.18	7.9–8.4	Low.
	100	65–95	15–55	[1]	[1]	2.0–20.0	0.09–0.14	7.9–8.4	Low.
	100	85–95	70–95	20–40	5–25	0.2–2.0	0.17–0.20	7.4–8.4	Moderate.
	100	90–100	45–55	20–30	0–5	2.0–6.0	0.14–0.16	7.4–7.8	Low.
		100	95–100	25–40	5–20	0.6–2.0	0.22–0.24	7.4–8.4	Low.
		100	95–100	25–35	5–15	0.6–2.0	0.20–0.22	7.4–8.4	Low.
		100	85–100	25–40	5–15	0.6–2.0	0.22–0.24	7.4–7.8	Low.
		100	90–100	30–40	5–15	0.6–2.0	0.20–0.22	7.4–7.8	Low.
		100	80–95	20–35	0–10	0.6–2.0	0.17–0.19	7.9–8.4	Low.
		100	85–100	25–40	5–15	0.6–2.0	0.22–0.24	8.5–9.0	Low.
		100	90–100	30–40	5–15	0.6–2.0	0.20–0.22	8.5–9.0	Low.
		100	80–95	20–35	0–10	0.6–2.0	0.17–0.19	8.5–9.5	Low.
		100	80–95	30–40	5–20	0.2–0.6	0.21–0.23	7.4–7.8	Moderate.
		100	90–100	30–40	5–15	0.6–2.0	0.20–0.22	7.4–7.8	Low.
		100	80–95	20–35	0–10	0.6–2.0	0.17–0.19	7.9–8.4	Low.
100	95–100	80–95	51–70	20–30	0–5	0.6–2.0	0.20–0.22	7.4–7.8	Low.
	100	80–100	51–75	20–30	0–5	0.6–2.0	0.17–0.19	7.4–7.8	Low.
	100	90–100	45–55	20–30	0–5	2.0–6.0	0.14–0.16	7.9–8.4	Low.
100	95–100	80–95	51–70	20–30	0–8	0.6–2.0	0.20–0.22	7.4–7.8	Low.
100	90–100	80–90	51–65	20–30	0–5	0.6–2.0	0.17–0.19	7.4–7.8	Low.
98–100	90–98	75–90	60–75	15–30	0–5	0.6–2.0	0.17–0.19	7.9–8.4	Low.
85–95	80–90	60–85	40–60	0–20	0–5	2.0–6.0	0.13–0.15	6.6–7.3	Low.
80–90	70–80	60–70	30–40	[1]	[1]	2.0–6.0	0.10–0.12	6.6–7.3	Low.
50–70	35–50	10–30	0–5	[1]	[1]	>20.0	0.02–0.04	6.6–7.3	Low.
	100	90–100	25–45	[1]	[1]	6.0–20.0	0.10–0.12	6.6–7.3	Low.
	100	90–95	25–40	[1]	[1]	6.0–20.0	0.09–0.11	6.6–7.3	Low.
	100	90–95	15–35	[1]	[1]	6.0–20.0	0.08–0.10	6.6–7.8	Low.
100	95–100	90–95	20–40	[1]	[1]	6.0–20.0	0.10–0.12	7.9–8.4	Low.
100	95–100	80–95	5–20	[1]	[1]	6.0–20.0	0.05–0.07	7.9–8.4	Low.

TABLE 5.—*Estimates of soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	USDA texture	Classification: Unified	Classification: AASHTO
	Feet	*Inches*			
Fillmore: Fm	>10	0–9	Silt loam	ML	A–4
		9–35	Silty clay	CH	A–7
		35–60	Loam and silt loam	CL	A–4 or A–6
Gravelly alluvial land: Ga	[4] 0–2	(²)	(²)	(²)	(²)
Hall: HaA, HaB, Hb	>10	0–22	Silt loam	ML or ML–CL	A–4 or A–6
		22–32	Light silty clay loam	CL	A–7
		32–60	Silt loam	CL or CL–ML	A–4 or A–6
*Hersh:					
HcB, HeC, HeD, HfF, HgD. For Anselmo parts of units HcB and HfF, see Anselmo series. For Valentine part of unit HgD, see unit VbB of Valentine series.	>10	0–7	Fine sandy loam	SM–SC, SM, or ML	A–4
		7–48	Fine sandy loam	SM–SC, SM, or ML	A–4 or A–2
		48–60	Fine sandy loam	SM–SC, SM, or ML	A–4
HdC. For Valentine part of unit HdC, see unit VbB of Valentine series.	>10	0–6	Loamy fine sand	SM	A–4 or A–2
		6–28	Sandy loam	ML or SM	A–4
		28–60	Sand	SP, SP–SM, or SM	A–2 or A–3
*Hobbs:					
HhB, HhC	>10	0–10	Silt loam or fine sandy loam	SM, ML, or SM–SC	A–4
		10–35	Silt loam	ML	A–4
		35–60	Very fine sandy loam	ML	A–4
HkA, HkB, HkC, Hm. For McCook part of unit Hm, see McCook series.	>10	0–35	Silt loam	ML or CL	A–4 or A–6
		35–60	Very fine sandy loam	ML–CL or ML	A–4
*Holdrege:					
HnB, HpC	>10	0–7	Fine sandy loam	ML or SM	A–4
		7–16	Silt loam	CL	A–4 or A–6
		16–23	Silty clay loam	CL	A–6
		23–60	Silt loam and very fine sandy loam.	ML	A–4
HoB, HoC, HoC2, HrD. For Uly part of unit HrD, see Uly series.	>10	0–16	Silt loam	ML–CL or CL	A–4 or A–6
		16–23	Light silty clay loam	CL	A–6
		23–60	Silt loam	CL–ML or CL	A–4 or A–6
Hord:					
HsB	>10	0–13	Fine sandy loam and loam	ML, ML–CL, or SM	A–4
		13–30	Silt loam and light silty clay loam.	CL	A–6
		30–60	Silt loam	CL–ML or CL	A–4 or A–6
HtA, HtB, HxA, HxB	>10	0–34	Silt loam	ML–CL or CL	A–4 or A–6
		34–49	Light silty clay loam	CL	A–6
		49–60	Silt loam	CL–ML or CL	A–4 or A–6
Humbarger: Hz	6–8	0–26	Loam	ML or CL	A–4
		26–48	Loam and sandy loam	SM or ML	A–2 or A–4
		48–60	Coarse sand and gravel	SP	A–3
Inavale: In	6–10	0–15	Loamy fine sand and loamy sand.	SM	A–2
		15–60	Fine sand or loamy fine sand	SP–SM or SM	A–2 or A–3
*Lawet:					
La	2–4	0–8	Fine sandy loam	SM or ML	A–4
		8–28	Silt loam and loam	CL	A–6
		28–46	Sandy loam and sand	SP–SM or SM	A–2
		46–60	Sand and gravel	SP or SP–SM	A–1 or A–3
Lb, Lc	[5] 1–3	0–25	Silt loam	CL	A–6
		25–46	Silt loam	CL	A–6
		46–52	Loamy fine sand	SM or SP–SM	A–2 or A–3
		52–60	Clay loam	CL	A–6 or A–7

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)						
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*	
------------	------------	100	95–100	20–40	0–10	0.6–2.0	0.22–0.24	6.1–7.3	Low.
------------	------------	100	95–100	50–75	25–50	<0.06	0.11–0.13	6.6–7.8	High.
------------	100	95–100	95–100	25–40	10–20	0.6–2.0	0.17–0.22	7.4–7.8	Low.
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
------------	100	95–100	85–100	25–40	5–15	0.6–2.0	0.22–0.24	6.6–7.8	Low.
------------	------------	100	95–100	41–50	20–30	0.2–0.6	0.18–0.20	7.4–7.8	Moderate.
------------	100	95–100	80–95	25–35	5–15	0.6–2.0	0.20–0.22	7.4–8.4	Low.
------------	100	90–100	40–55	15–25	0–5	2.0–6.0	0.16–0.18	6.6–7.3	Low.
------------	100	90–100	30–55	15–25	0–5	2.0–6.0	0.15–0.17	7.4–7.8	Low.
100	95–100	85–100	40–55	0–25	0–5	2.0–6.0	0.14–0.16	7.4–7.8	Low.
100	95–100	85–90	30–50	(1)	(1)	6.0–20.0	0.10–0.12	6.6–7.3	Low.
------------	100	90–100	45–70	0–20	0–5	2.0–6.0	0.12–0.14	6.9–7.3	Low.
100	95–100	70–85	3–20	(1)	(1)	6.0–20.0	0.05–0.07	7.4–7.8	Low.
------------	95–100	75–90	40–55	0–25	0–5	2.0–6.0	0.16–0.18	6.6–7.3	Low.
------------	100	90–100	65–85	25–40	0–10	0.6–2.0	0.17–0.22	6.6–7.8	Low.
------------	100	85–95	55–70	20–35	0–10	0.6–2.0	0.17–0.19	7.4–8.4	Low.
------------	100	95–100	90–100	25–35	0–15	0.6–2.0	0.20–0.24	6.6–7.8	Low.
------------	100	90–100	65–75	0–20	0–5	0.6–2.0	0.17–0.19	7.4–8.4	Very low.
------------	100	95–100	40–55	20–30	0–5	2.0–6.0	0.16–0.18	6.6–7.3	Very low.
------------	100	98–100	85–100	25–40	8–20	0.6–2.0	0.22–0.24	7.4–7.8	Low.
------------	------------	100	85–100	30–40	15–25	0.6–2.0	0.18–0.20	7.4–7.8	Moderate.
------------	100	85–100	55–80	25–40	0–10	0.6–2.0	0.17–0.22	7.4–8.4	Low.
------------	100	95–100	85–100	25–40	5–15	0.6–2.0	0.22–0.24	6.6–7.8	Low.
------------	------------	100	85–100	30–40	15–25	0.6–2.0	0.18–0.20	7.9–8.4	Moderate.
------------	100	95–100	80–95	25–40	5–15	0.6–2.0	0.20–0.22	7.9–8.4	Low.
------------	100	90–99	45–65	20–30	0–10	0.6–6.0	0.16–0.22	6.6–7.3	Low.
------------	------------	100	75–90	20–40	11–20	0.2–2.0	0.18–0.22	6.6–7.8	Moderate.
------------	------------	100	80–95	25–40	5–15	0.6–2.0	0.20–0.22	7.9–8.4	Low.
------------	------------	100	85–100	25–40	5–15	0.6–2.0	0.20–0.24	6.6–7.8	Low.
------------	------------	100	75–90	25–40	11–20	0.6–2.0	0.18–0.20	7.4–7.8	Moderate.
------------	------------	100	80–95	25–40	5–15	0.6–2.0	0.20–0.22	7.4–7.8	Low.
------------	100	85–90	51–70	0–20	0–10	0.6–2.0	0.17–0.22	7.4–7.8	Low.
------------	100	65–95	30–65	(1)	0–10	0.6–6.0	0.11–0.19	7.4–8.4	Low.
95–100	85–95	50–65	0–5	(1)	(1)	>20.0	0.02–0.04	6.6–7.3	Low.
95–100	90–98	50–75	15–30	(1)	(1)	6.0–20.0	0.10–0.12	6.6–7.8	Low.
100	95–100	60–80	5–15	(1)	(1)	6.0–20.0	0.05–0.10	7.3–8.4	Low.
------------	100	70–85	45–55	(1)	(1)	2.0–6.0	0.16–0.18	7.9–8.4	Low.
------------	100	95–100	60–80	30–40	15–25	0.6–2.0	0.17–0.22	7.9–8.4	Low.
100	95–100	50–70	10–35	(1)	(1)	2.0–20.0	0.11–0.16	7.4–7.8	Low.
100	95–100	45–65	0–10	(1)	(1)	>20.0	0.02–0.04	6.6–8.4	Low.
100	95–100	85–100	51–70	30–40	11–20	0.6–2.0	0.20–0.24	7.9–8.4	Low.
------------	100	95–100	60–80	30–40	15–25	0.6–2.0	0.20–0.22	7.9–8.4	Low.
------------	------------	100	5–20	(1)	(1)	6.0–20.0	0.08–0.10	7.4–7.8	Low.
95–100	95–100	85–100	55–85	30–50	15–30	0.2–0.6	0.14–0.16	7.4–7.8	Moderate.

TABLE 5.—*Estimates of soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	USDA texture	Classification	
				Unified	AASHTO
	Feet	*Inches*			
Lawet, cont.:					
Ld, Le	2–4	0–10	Silt loam	CL	A–6
For Slickspots part of unit Le, see Slickspots.		10–35	Loam and silt loam	CL	A–6
		35–41	Fine sandy loam	SM or ML	A–4
		41–60	Sand and gravel	SP or SP–SM	A–1 or A–3
Lawet variant: Lf	1–3	0–30	Loam	ML, CL, or ML–CL	A–4
		30–60	Coarse sand and gravel	SP	A–3
Lex:					
Lg	2–4	0–20	Loam	ML or ML–CL	A–4
		20–30	Very fine sandy loam and silty clay.	CL	A–6
		30–60	Coarse sand and gravel	SP	A–3
Lh	2–4	0–30	Loam and light silty clay loam.	CL–ML or CL	A–4 or A–6
		30–60	Coarse sand and gravel	SP	A–3
Loup: Lo	0–2	0–8	Loam	ML or ML–CL	A–4
		8–60	Sand	SP or SP–SM	A–3
Marsh: Ma	[5] 0–2	(2)	(2)	(2)	(2)
McCook:					
Mb	4–15	0–10	Loam and very fine sandy loam	ML, CL, or ML–CL	A–4
		10–38	Very fine sandy loam	ML or CL–ML	A–4
		38–60	Fine sand	SM	A–2
Mc	4–6	0–15	Loam	ML, ML–CL, or CL	A–4
		15–30	Clay loam	CL	A–6 or A–4
		30–40	Loam	ML, ML–CL, or CL	A–4
		40–60	Sand and gravel	SP	A–3
Muck: Mu	0–3	(2)	(2)	(2)	(2)
*Platte: Pa	2–4	0–11	Loam	SM or SC	A–4
For Alda part of unit Pa, see Alda series.		11–14	Fine sandy loam	SM	A–2
		14–60	Sand and gravel	SP	A–3
Riverwash: Ra	0–3	(2)	(2)	(2)	(2)
Rough broken land, loess: Rb	>10	0–60	Silt loam	ML–CL or CL	A–4 or A–6
Scott: Sc	>10	0–9	Silt loam and silty clay loam.	ML–CL or CL	A–4 or A–6
		9–60	Silty clay	CH	A–7
Silver Creek:					
Se	3–5	0–18	Silt loam and silty clay loam.	ML	A–4, A–5, or A–7.
		18–34	Silty clay	CH	A–7
		34–39	Clay loam	CL or CH	A–7
		39–60	Sand and gravel	SP or SP–SM	A–3 or A–1
Su	3–5	0–9	Silt loam	ML	A–4, A–5, or A–7
		9–43	Silty clay and silty clay loam.	CL or CH	A–7
		43–60	Sand and gravel	SP	A–1 or A–3
Slickspots:					
Mapped only in unit Le of Lawet series.	2–4	0–10	Loam and silt loam	ML	A–4
		10–22	Silty clay loam	CL	A–6 or A–7
		22–60	Loam and very fine sandy loam	ML–CL or ML	A–4
*Uly: UaC2, UaD, UcD, UeE	>10	0–9	Silt loam	ML–CL, ML, or CL	A–4 or A–6
For Coly parts of units UcD and UeE, see Coly series.		9–15	Silt loam	CL or ML	A–6 or A–7
		15–60	Silt loam	ML–CL, ML, or CL	A–4 or A–6

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)						
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*	
100	95–100	85–100	51–70	30–40	11–20	0.6–2.0	0.22–0.24	7.9–10.0	Low.
	100	95–100	60–80	30–40	15–25	0.6–2.0	0.17–0.22	9.0–10.5	Low.
	100	70–85	45–55	(1)	(1)	2.0–6.0	0.14–0.16	7.4–8.4	Low.
95–100	90–98	45–65	0–8	(1)	(1)	>20.0	0.02–0.04	6.6–8.4	Low.
	100	85–95	60–75	<30	0–10	0.6–2.0	0.17–0.22	7.9–8.4	Low.
95–100	85–100	50–70	0–5	(1)	(1)	>20.0	0.02–0.04	7.4–7.8	Low.
100	90–100	80–95	55–70	0–25	0–6	0.6–2.0	0.17–0.22	7.9–8.4	Low.
100	95–100	85–95	51–85	30–40	11–25	0.6–2.0	0.11–0.19	7.9–8.4	Moderate.
95–100	85–100	50–70	0–5	(1)	(1)	>20.0	0.02–0.04	7.4–7.8	Low.
	100	85–100	65–90	20–35	5–15	0.6–2.0	0.18–0.23	8.5–10.0	Moderate.
95–100	85–100	50–70	0–5	(1)	(1)	>20.0	0.02–0.04	7.4–9.0	Low.
	100	85–90	60–75	20–35	0–10	0.6–2.0	0.20–0.22	6.6–7.3	Low.
100	98–100	60–80	2–10	(1)	(1)	6.0–20.0	0.05–0.07	7.4–7.8	Low.
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
	100	95–100	60–85	20–30	0–10	0.6–2.0	0.20–0.22	6.6–7.8	Low.
	100	80–95	55–70	0–20	0–7	0.6–2.0	0.17–0.19	7.4–8.4	Low.
	100	65–80	20–35	(1)	(1)	6.0–20.0	0.05–0.07	7.9–8.4	Low.
	100	95–100	60–85	20–30	0–10	0.6–2.0	0.20–0.22	7.9–9.0	Low.
	100	85–100	51–80	30–40	10–25	0.6–2.0	0.15–0.17	8.5–10.0	Moderate.
	100	95–100	60–85	20–30	0–10	0.6–2.0	0.17–0.19	9.0–10.5	Low.
95–100	85–100	50–70	0–5	(1)	(1)	>20.0	0.02–0.04	7.9–8.4	Low.
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
100	95–100	85–95	35–50	15–30	0–10	0.6–2.0	0.20–0.22	7.9–8.4	Low.
100	95–100	90–95	20–30	(1)	(1)	0.6–2.0	0.15–0.17	7.9–8.4	Low.
95–100	85–95	50–70	0–5	(1)	(1)	>20.0	0.02–0.04	7.4–7.8	Low.
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	Low.
		100	95–100	25–35	5–15	0.6–2.0	0.20–0.22	7.4–8.4	Low.
		100	95–100	25–45	5–20	0.2–2.0	0.18–0.24	6.6–7.3	Low or moderate.
		100	95–100	50–70	30–45	<0.06	0.11–0.13	7.4–8.4	High.
100	99–100	95–99	55–70	30–45	5–15	0.2–2.0	0.22–0.23	7.9–8.4	Moderate.
100	95–100	90–100	70–90	55–70	30–45	0.06–0.2	0.11–0.13	7.9–8.4	High.
100	90–100	75–90	51–75	45–65	25–45	0.2–0.6	0.15–0.17	7.9–8.4	High.
95–100	85–95	40–65	0–5	(1)	(1)	>20.0	0.02–0.04	7.9–8.4	Low.
100	95–100	95–100	55–70	35–50	5–15	0.6–2.0	0.22–0.24	7.9–8.4	Low.
100	95–100	90–95	70–90	45–70	25–45	0.06–0.6	0.15–0.20	8.5–9.0	High.
95–100	85–96	40–65	0–5	(1)	(1)	>20.0	0.02–0.04	7.4–7.8	Low.
	100	85–95	70–85	20–35	0–10	0.6–2.0	0.20–0.24	9.0–10.5	Low.
	100	95–100	80–90	35–50	20–25	0.2–0.6	0.18–0.20	8.5–9.5	Moderate.
	100	85–100	51–90	0–20	0–5	0.6–2.0	0.17–0.19	7.9–8.4	Low.
		100	90–100	30–40	5–15	0.6–2.0	0.22–0.24	7.4–7.8	Low.
		100	90–100	30–45	11–25	0.6–2.0	0.20–0.22	7.4–7.8	Low.
		100	90–100	30–40	5–15	0.6–2.0	0.20–0.22	7.9–8.4	Low.

TABLE 5.—*Estimates of soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	USDA texture	Classification: Unified	Classification: AASHTO
	Feet	*Inches*			
Valentine:					
VaE, VcF	>10	0–6	Fine sand	SM or SP	A–2 or A–3
		6–14	Fine sand	SP or SP–SM	A–2 or A–3
		14–60	Fine sand	SP or SP–SM	A–2 or A–3
VbB, VbE	>10	0–14	Loamy fine sand	SM	A–2
		14–47	Fine sand	SP or SM	A–2 or A–3
		47–60	Loamy fine sand	SM	A–2
Vetal: VeB	>10	0–30	Fine sandy loam	SM, ML, or SM–SC	A–4
		30–46	Fine sandy loam	SM, ML, or SM–SC	A–4
		46–60	Loam and light silty clay loam.	CL	A–4 or A–6
Wann:					
Wb	2–4	0–14	Fine sandy loam	ML, SM, or SM–SC	A–4
		14–34	Fine sandy loam	ML, SM, or SM–SC	A–4
		34–60	Fine sandy loam	SM or ML	A–2 or A–4
Wf	2–5	0–14	Fine sandy loam	ML, SM, or SM–SC	A–4
		14–34	Fine sandy loam	ML, SM, or SM–SC	A–4
		34–60	Fine sandy loam	SM or ML	A–2 or A–4
Wm	2–5	0–14	Loam	ML or SM	A–4
		14–34	Fine sandy loam	ML, SM, or SM–SC	A–4
		34–60	Fine sandy loam	SM or ML	A–2 or A–4
Wet alluvial land: Wx	0–2½	(2)	(2)	(2)	(2)

1 Nonplastic.
2 Too variable to be rated.
3 Depth to seasonal high water table is 2–4 feet in unit Cu.
4 Subject to occasional flooding.
5 Depth to seasonal high water table is 2–4 feet in unit Lc.
6 Ponded to a depth of 0.5 foot in places.

with these soils are a few small areas of soils where bedrock is at a shallow or moderate depth. Other properties given in table 5 are discussed in the following paragraphs.

The liquid limit and plasticity index are measures of the consistence of a soil. As the moisture content of a clayey soil increases from a dry condition, the soil changes from a semisolid to a plastic state. If the moisture content is further increased, the soil changes from a plastic to a liquid state. The *plastic limit* is the moisture content at which the soil material changes from a semisolid to a plastic state. The *liquid limit* is the moisture content at which the soil changes from a plastic to a liquid state. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of water content within which a soil material is considered to be plastic. The liquid limit and plasticity index are estimated in table 5, but in table 7 they are based on tests of soil samples.

Permeability is the rate at which water moves through an undisturbed soil in a vertical direction under a unit head of pressure. It is estimated on the basis of structure, texture, density, and other soil characteristics observed in the field. Lateral seepage or transient soil features such as plowpans and surface crusts are not considered.

Available water capacity is a measure of the capacity of soils to hold water for use by most plants. It is defined as the difference between the amount of water in a soil at field capacity and the amount at the wilting point of most plants.

Reaction of a soil is the degree of acidity or alkalinity, expressed as a pH value or reaction class. The pH value and terms used to describe soil reaction are explained in the Glossary at the back of this report.

Shrink-swell potential is an indication of the change in volume to be expected in a soil when the moisture content is changed. It rates the extent to which the soil shrinks as it dries or swells when it gets wet. Generally, soils with a high clay content have a high shrink-swell potential and clean sands and gravels have a low shrink-swell potential. For engineering purposes, soils having a high shrink-swell potential are the most hazardous. Shrinking and swelling of soils can damage building foundations, roads, and other structures. In table 5, the shrink-swell potential is not indicated for soils that shrink markedly on drying but do not swell quickly on rewetting.

Engineering interpretations of the soils

The soils of Lincoln County are summarized in table 6 with respect to their usefulness for various engineering purposes. The interpretations are based on the engineering properties of soils shown in table 5, on test data for soils in this survey area and in other nearby or adjoining areas, and

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)						
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*	
------------	100	80–95	3–15	(1)	(1)	6.0–20.0	0.07–0.09	6.6–7.3	Low.
------------	100	80–95	0–12	(1)	(1)	6.0–20.0	0.06–0.08	7.4–7.8	Low.
------------	100	80–95	0–12	(1)	(1)	6.0–20.0	0.05–0.07	7.4–7.8	Low.
------------	100	85–100	12–25	(1)	(1)	6.0–20.0	0.10–0.12	6.6–7.3	Low.
------------	100	80–95	0–15	(1)	(1)	6.0–20.0	0.06–0.08	7.4–7.8	Low.
------------	100	85–100	12–25	(1)	(1)	6.0–20.0	0.08–0.10	7.4–7.8	Low.
------------	100	90–100	40–55	20–30	0–10	2.0–6.0	0.16–0.18	6.6–7.8	Low.
------------	100	90–100	40–55	20–30	0–10	2.0–6.0	0.15–0.17	7.4–7.8	Low.
------------	100	95–100	70–90	25–40	10–20	0.6–2.0	0.17–0.20	7.4–7.8	Moderate.
100	95–100	85–95	45–55	0–20	0–5	2.0–6.0	0.16–0.18	7.9–8.4	Low.
100	95–100	85–95	45–55	0–20	0–5	2.0–6.0	0.15–0.17	7.9–8.4	Low.
100	95–100	80–90	20–55	(1)	(1)	2.0–6.0	0.14–0.16	7.9–8.4	Low.
100	95–100	85–95	45–55	0–20	0–5	2.0–6.0	0.16–0.18	7.9–8.4	Low.
100	95–100	85–95	45–55	0–20	0–5	2.0–6.0	0.15–0.17	8.5–9.0	Low.
100	95–100	80–90	20–55	(1)	(1)	2.0–6.0	0.14–0.16	7.9–9.0	Low.
------------	100	70–95	40–75	0–30	0–5	0.6–2.0	0.20–0.22	7.9–8.4	Low.
100	95–100	85–95	45–55	0–20	0–5	2.0–6.0	0.15–0.17	7.9–8.4	Low.
100	95–100	80–90	20–55	(1)	(1)	2.0–6.0	0.14–0.16	7.9–8.4	Low.
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)

on information obtained from engineers and soil scientists acquainted with the soils of the county. In table 6, the soils are rated with respect to their limitations for use as septic tank absorption fields, sewage lagoons, shallow excavations, dwellings (with or without basements), sanitary landfill, and local roads and streets. They are also rated with respect to their suitability as a source of roadfill, sand, and topsoil. In addition, the table gives soil features that affect the planning, installation, and maintenance of reservoir areas, embankments, drainage of cropland and pasture, irrigation, and terraces and diversions. The ratings, uses of the soils, and characteristics affecting these uses are discussed in the following paragraphs.

The limitations of a soil for a specified use are rated *slight, moderate, severe,* or *very severe. Slight* means soil properties generally are favorable for the stated use or, in other words, limitations are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* means soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required. *Very severe* means one or more soil properties are so unfavorable that overcoming the limitations is most difficult and costly and commonly is not practical.

The suitability of a soil for a specified use is rated *good fair, poor,* or *unsuited.* The meanings of these ratings approximately parallel those of the terms *slight, moderate, severe,* and *very severe,* respectively.

Explanation of the columns in table 6 are presented in the following paragraphs.

Septic-tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. Soil material from a depth of 18 inches to 5 feet is evaluated in reference to its effect on both the absorption of effluent and the construction and operation of the system. Permeability of the soil, its susceptibility to flooding, and depth to the water table affect absorption. The slope of the soil affects the difficulty of layout and construction and also influences lateral seepage, the downslope flow of effluent, and the possibility of erosion. Large rocks and boulders in the soil increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet for a period long enough for bacteria to decompose the solids. Such lagoons need to be protected from flooding. The floor of a lagoon is nearly level and the sides, or embankments, are of soil material that generally is compacted to medium density. The permeability and slope of the soil and its organic-matter content affect the pond floor. If the floor needs to be leveled, depth to bedrock

TABLE 6.—*Interpretations of*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two kinds of soil. The soils in such mapping series that appear in the

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Alda: Ad	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; moderately rapid to very rapid permeability; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; mixed sand and gravel below a depth of 2.5 feet.	Severe: seasonal high water table at a depth of 2 to 4 feet; subject to frost action.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; subject to frost action.	Poor to a depth of 2.5 feet: subject to frost action; erodible by water. Good below a depth of 2.5 feet.
Anselmo: AfB, AfC, AnB, AnC, AnD.	Slight	Severe: moderately rapid permeability.	Slight for slopes less than 8 percent; moderate for slopes more than 8 percent; hazard of caving.	Moderate: subject to frost action.	Severe: moderately rapid permeability. Area type better suited than trench type on slopes.	Moderate: subject to frost action; slopes erodible.	Fair: low shrink-swell potential; subject to frost action; needs compaction control; slopes erodible.
Bankard variant: Bk.	Moderate to severe: moderate permeability between depths of 2.5 and 5 feet; severe hazard of polluting ground water.	Severe: rapid permeability; possible sealing material (CL soil) available between depths of 2.5 and 5 feet.	Slight: hazard of caving.	Moderate: sand to a depth of 2.5 feet; moderate permeability between depths of 2.5 and 5 feet; hazard of caving; subject to frost action.	Severe: rapid permeability above and below the clay loam layer; hazard of polluting ground water.	Moderate: subject to frost action.	Fair: low to moderate shrink-swell potential; subject to frost action; borrow pits provide nonuniform soil mixture.
Blown-out land: Bo	Moderate: slopes 3 to 15 percent.	Severe: rapid permeability; slopes 3 to 15 percent.	Severe: slopes 3 to 15 percent; coarse texture; hazard of caving.	Severe: slopes 3 to 15 percent; hazard of caving; subject to frost action.	Severe: rapid permeability; coarse texture; subject to frost action.	Moderate: slopes 3 to 15 percent; subject to frost action; erodible by wind.	Good: low shrink-swell potential; subject to frost action; slopes erodible by wind.
Caruso: Cb	Severe: seasonal high water table at a depth of 5 to 7 feet; moderately slow permeability; hazard of polluting ground water.	Slight: potential for sealing a lagoon in upper 3 feet of soil.	Moderate: seasonal high water table at a depth of 5 to 7 feet; hazard of caving.	Moderate: seasonal high water table at a depth of 5 to 7 feet; moderate shrink-swell potential; hazard of caving; subject to frost action.	Severe: seasonal high water table at a depth of 5 to 7 feet; rapid permeability in lower part of profile.	Moderate: moderate shrink-swell potential; subject to frost action.	Fair: moderate shrink-swell potential; subject to frost action; seasonal high water table at a depth of 5 to 7 feet.

engineering properties of the soils

units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to the other first column of this table]

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Fair below a depth of 2.5 feet: seasonal high water table at a depth of 2 to 4 feet.	Good to a depth of 2 feet: medium texture, medium fertility; slopes erodible by wind and water.	Fair: thin layer.	Very rapid permeability below a depth of 2.5 feet; seasonal high water table at a depth of 2 to 4 feet; sand below a depth of 2.5 feet; dugout ponds feasible.	Good compaction characteristics to a depth of 2.5 feet; subject to seepage; erodible by water.	Seasonal high water table at a depth of 2 to 4 feet; very rapid permeability below a depth of 2.5 feet.	Low available water capacity; moderately deep soils with sand below a depth of 2.5 feet.	Not needed.
Poor: sand below a depth of 3 feet; limited uses because of gradation.	Fair to a depth of 1.25 feet: moderately coarse texture; medium fertility; very friable; slopes erodible by water.	Good	Moderately rapid permeability; nearly level to moderately steep slopes.	Good compaction characteristics; erodible by water; medium permeability of compacted soil.	Not needed	Moderate available water capacity; moderately rapid intake rate; suited only where slopes are less than 9 percent.	Moderately coarse texture; moderately rapid permeability; nearly level to moderately steep slopes.
Poor: possible source below a depth of 6 feet.	Poor: coarse texture; low fertility.	Fair: too sandy.	Rapid permeability; nearly level slopes; low storage potential; possible sealing material at a depth of 2.5 to 5 feet.	Fair to good compaction characteristics; borrow pits provide nonuniform soil mixture; erodible by water.	Rapid permeability in upper part; moderate permeability in lower part; seasonal high water table at a depth of 6 to 15 feet.	Low available water capacity; moderately rapid intake rate.	Not needed.
Good to fair: limited uses because of gradation.	Poor: coarse texture; low fertility.	Poor: too sandy.	Rapid permeability; subject to vertical seepage.	Fair to good compaction characteristics; medium to high susceptibility to seepage.	Unsuited	Unsuited	Unsuited.
Poor: possible source below a depth of 5 feet.	Good to fair to a depth of 0.8 foot: medium texture; medium fertility; very friable.	Good	Rapid permeability in lower part; nearly level slopes; low storage potential.	Compaction characteristics are variable; good workability.	Seasonal high water table at a depth of 5 to 7 feet; rapid permeability in lower part.	Moderate available water capacity; moderately low intake rate.	Not needed.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Cass: CeB	Slight where not flooded; moderate where rarely flooded: seasonal high water table at a depth of 7 to 12 feet; hazard of polluting ground water.	Severe: moderately rapid permeability.	Slight: hazard of caving where soil is moist.	Moderate: seasonal high water table at a depth of 7 to 12 feet; subject to frost action.	Severe: moderately rapid to rapid permeability in lower part in some areas.	Moderate: subject to frost action.	Good to fair: low shrink-swell potential; subject to frost action.
Cass: Cf	Moderate: seasonal high water table at a depth of 5 to 8 feet; moderately slow permeability in lower part; hazard of polluting ground water; occasional flooding in places.	Severe: moderately rapid permeability in upper part.	Slight: hazard of caving where soil is moist.	Moderate: seasonal high water table at a depth of 5 to 8 feet; subject to frost action.	Severe: moderately rapid to rapid permeability in upper part.	Moderate: moderate shrink-swell potential; subject to frost action.	Good to fair: low shrink-swell potential; subject to frost action.
Coly: CoD, CoE, CoF.	Slight for slopes of less than 8 percent; moderate for slopes of 8 to 15 percent; severe for slopes of more than 15 percent.	Moderate for slopes of 7 percent; severe for slopes of more than 7 percent: moderate permeability.	Moderate for slopes of less than 15 percent; severe for slopes of more than 15 percent: vertical cuts in moist soil subject to caving.	Moderate for slopes of less than 15 percent; severe for slopes of more than 15 percent: vertical cuts in moist soil subject to caving; subject to frost action.	Slight for area type; moderate for trench type: slopes of 7 to 30 percent.	Moderate for slopes of less than 15 percent; severe for slopes of more than 15 percent: subject to frost action; erodible by water.	Fair: subject to frost action; needs compaction control; slopes of 7 to 30 percent for borrow areas; unprotected slopes erodible by water.
Cozad: CsA, CsB, CsC, Cv	Slight	Moderate: moderate permeability; slopes more than 2 percent in places.	Slight	Slight	Slight	Moderate: subject to frost action.	Fair: low shrink-swell potential; subject to frost action; needs compaction control; slopes erodible by water.
Ct	Severe: seasonal high water table at a depth of 2 to 6 feet; moderate permeability.	Severe: seasonal high water table at a depth of 2 to 6 feet; moderate permeability.	Severe: seasonal high water table at a depth of 2 to 6 feet; hazard of caving.	Severe: seasonal high water table at a depth of 2 to 6 feet; subject to frost action; basements subject to seepage.	Severe: seasonal high water table at a depth of 2 to 6 feet; moderate permeability.	Moderate: moderate shrink-swell potential; subject to frost action.	Fair to poor: moderate shrink-swell potential; subject to frost action; seasonal high water table at a depth of 2 to 6 feet.

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Good to fair: sand below a depth of 3 feet in some areas; gradation limited to finer sizes.	Good to a depth of 2.2 feet: moderately coarse texture; medium fertility; very friable; erodible by water.	Good	Moderately rapid permeability; seasonal high water table at a depth of 7 to 12 feet; nearly level slopes; low storage potential; severe hazard of seepage in places.	Fair to good compaction characteristics; medium to high susceptibility to seepage.	Moderately rapid permeability; seasonal high water table at a depth of 7 to 12 feet.	Moderate available water capacity; moderately rapid intake rate.	Not needed.
Poor: possible source below a depth of 5 feet; gradation limited to finer sizes.	Good: moderately coarse texture; medium fertility; very friable; erodible by water.	Good	Moderately rapid permeability; seasonal high water table at a depth of 5 to 8 feet; nearly level slopes; low storage potential; severe hazard of seepage.	Fair to good compaction characteristics; medium to high susceptibility to seepage.	Moderately rapid permeability; seasonal high water table at a depth of 5 to 8 feet.	Moderate available water capacity; moderately rapid intake rate.	Not needed.
Unsuited	Poor: medium texture; low fertility.	Fair for slopes up to 15 percent; poor for slopes of more than 15 percent.	Moderate permeability; favorable storage sites.	Fair compaction characteristics; subject to extreme consolidation when loaded and saturated; medium to low permeability when properly compacted.	Rapid runoff; erodible by water.	Suited only where slopes are less than 9 percent; high available water capacity; erodible by water.	Slopes erodible by water; drainage outlets needed in places; subject to siltation.
Unsuited	Good to a depth of 0.7 to 1.5 feet: moderately coarse texture; medium fertility; very friable.	Good	Moderate permeability; nearly level to gentle slopes; low storage potential.	Fair compaction characteristics; medium to low permeability when properly compacted.	Moderate permeability; nearly level to gentle slopes; good stability.	High available water capacity; moderate intake rate.	All features favorable. Need greatest on gentle slopes.
Unsuited	Fair to good: moderately coarse texture; medium fertility; very friable; limited by seasonal high water table at a depth of 2 to 6 feet.	Fair: alkaline.	Moderate permeability; seasonal high water table at a depth of 2 to 6 feet; nearly level slopes; low storage potential; dugout pond feasible.	Fair compaction characteristics; subject to horizontal seepage.	Seasonal high water table at a depth of 2 to 6 feet; moderate permeability; fair surface drainage; adequate drainage outlets unavailable in places.	High available water capacity; moderate intake rate; alkaline soil.	Not needed.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Cozad, cont.: Cu	Severe: seasonal high water table at a depth of 2 to 4 feet; moderate permeability.	Severe: seasonal high water table at a depth of 2 to 4 feet; moderate permeability.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving.	Severe: seasonal high water table at a depth of 2 to 4 feet; subject to frost action; basements subject to seepage.	Severe: seasonal high water table at a depth of 2 to 4 feet; moderate permeability.	Moderate: moderate shrink-swell potential; subject to frost action.	Fair to poor: moderate shrink-swell potential; subject to frost action; seasonal high water table at a depth of 2 to 4 feet.
Cozad variant: Cx	Slight	Moderate: moderate permeability.	Slight	Slight	Slight	Moderate: subject to frost action.	Fair: low shrink-swell potential; subject to frost action; needs compaction control; slopes erodible by water.
Creighton: CzE	Moderate for slopes of 7 to 15 percent; severe for slopes of more than 15 percent.	Severe: slopes more than 7 percent; moderate permeability.	Moderate for slopes of 7 to 15 percent; severe for slopes of more than 15 percent.	Moderate for slopes of 7 to 15 percent; severe for slopes of more than 15 percent: subject to frost action; erodible by water.	Slight to moderate: slopes of 7 to 20 percent. Area type better suited than trench type in places.	Moderate: slopes more than 7 percent; subject to frost action; erodible by water.	Good to fair: slopes of 7 to 20 percent; subject to frost action; erodible by water.
Dix: DbF	Moderate for slopes of 5 to 15 percent; severe for slopes of more than 15 percent.	Severe: slopes more than 5 percent; moderately rapid permeability in upper part.	Severe: slopes more than 5 percent; poor workability; sidewalls unstable.	Moderate for slopes of 5 to 15 percent; severe for slopes of more than 15 percent.	Moderate to severe: slopes of 5 to 30 percent; moderately rapid to rapid permeability.	Moderate for slopes of 5 to 15 percent; severe for slopes of more than 15 percent; erodible by wind.	Fair for slopes of less than 15 percent; poor for slopes of more than 15 percent.
*Dunday: DuB, DvC. For interpretations of Valentine part of unit DvC, see unit VbB of Valentine series.	Slight	Severe: rapid permeability.	Moderate: poor sidewall stability.	Slight	Severe: rapid permeability; erodible by wind and water.	Slight	Good: erodible by wind.
Elsmere: EaB, ExC	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; rapid permeability; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving.	Severe: seasonal high water table at a depth of 2 to 4 feet; upper foot subject to frost action.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Moderate: seasonal high water table at a depth of 2 to 4 feet; subject to frost action.	Fair: seasonal high water table at a depth of 2 to 4 feet limits borrow areas.

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Unsuited	Fair to good: moderately coarse texture; medium fertility; very friable; can be limited by seasonal high water table at a depth of 2 to 4 feet.	Good	Moderate permeability; seasonal high water table at a depth of 2 to 4 feet; nearly level slopes; low storage potential; dugout pond feasible.	Fair compaction characteristics; subject to horizontal seepage.	Seasonal high water table at a depth of 2 to 4 feet; moderate permeability; fair surface drainage; adequate drainage outlets unavailable in places.	High available water capacity; moderate intake rate.	Not needed.
Unsuited	Good to a depth of 0.7 to 1.5 feet: moderately coarse texture; medium fertility; very friable.	Good	Moderate permeability: nearly level to very gentle slopes; low storage potential.	Fair compaction characteristics; medium to low permeability when properly compacted.	Moderate permeability; nearly level to very gentle slopes; good stability.	High available water capacity; moderate intake rate.	All features favorable.
Unsuited	Poor: depth of surface layer less than 0.7 foot; slopes of 7 to 20 percent; medium texture and fertility.	Fair: slope.	Moderate permeability; sandy layers subject to seepage; slopes of 7 to 20 percent; favorable storage potential.	Fair compaction characteristics; subject to consolidation when loaded and saturated.	Moderate permeability; good surface drainage.	Unsuited	Steeper slopes erodible; hazard of siltation in channels; revegetation of disturbed areas difficult in high lime carbonate areas.
Good below a depth of 1.5 feet: suited to most uses. Maximum depth unknown.	Poor: depth of surface layer less than 0.7 foot; medium texture; low fertility.	Poor: too sandy and difficult to reclaim.	Generally unsuited; very rapid permeability below a depth of 1.5 feet; subject to high seepage.	Fair to good compaction characteristics; upper 1.5 feet erodible by wind.	Very rapid permeability below a depth of 1.5 feet; very little runoff.	Generally unsuited; very low available water capacity.	Not needed.
Poor above a depth of 5 feet; fair below a depth of 5 feet: limited uses because of gradation.	Poor: coarse texture; medium fertility.	Fair: too sandy.	Rapid permeability; subject to high seepage.	Fair to good compaction characteristics; medium to low permeability when properly compacted.	Rapid permeability; good surface drainage.	Low available water capacity; rapid intake rate.	Not needed.
Fair to poor below a depth of 1.2 feet: seasonal high water table at depth of 2 to 4 feet; limited uses because of gradation.	Poor: seasonal high water table at a depth of 2 to 4 feet; coarse texture; medium fertility; erodible by wind.	Poor: too sandy.	Rapid permeability; seasonal high water table at a depth of 2 to 4 feet.	Good compaction characteristics; medium permeability when properly compacted.	Rapid permeability; seasonal high water table at a depth of 2 to 4 feet; slow runoff.	Low available water capacity; rapid intake rate.	Unsuited.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Fillmore: Fm	Severe: very slow permeability; subject to occasional flooding.	Moderate to severe: subject to occasional flooding; about 2 feet of soil available for sealing.	Severe: subject to occasional flooding.	Severe: subject to occasional flooding; high shrink-swell potential between depths of 1 to 3 feet; subject to frost action.	Severe: subject to occasional flooding.	Severe: subject to occasional flooding; high shrink-swell potential; subject to frost action.	Poor: high shrink-swell potential; subject to frost action; subject to occasional flooding.
Gravelly alluvial land: Ga. Too variable to be rated. Severe limitations for most uses.							
Hall: HaA, HaB, Hb	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight for dry soil; vertical cuts in moist soil subject to caving.	Slight: low to moderate shrink-swell potential; subject to frost action where surface drainage is poor.	Slight	Slight: low to moderate shrink-swell potential; subject to frost action where surface drainage is poor.	Good to fair: needs compaction control and good surface drainage; erodible by water on slopes.
*Hersh:							
HcB, HdC, HeC. For interpretations of Anselmo part of unit HcB, see Anselmo series. For interpretations of Valentine part of unit HdC, see unit VbB of Valentine series.	Slight	Severe: moderately rapid permeability.	Slight: vertical cuts subject to caving.	Slight to moderate: slopes as much as 5 percent in places; vertical cuts subject to caving.	Slight	Slight: erodible by wind and water.	Good: erodible by wind and water.
HeD, HgD. For interpretations of Valentine part of unit HgD, see unit VbB of Valentine series.	Slight	Severe: moderately rapid permeability.	Slight: vertical cuts subject to caving.	Moderate: slopes of 5 to 9 percent; vertical cuts subject to caving.	Slight: cover soil erodible by wind and water.	Slight: erodible by wind and water.	Good: erodible by wind and water.
HfF. For interpretations of Anselmo part of unit HfF, see Anselmo series.	Severe: slopes of 9 to 30 percent.	Severe: slopes of 9 to 30 percent; moderately rapid permeability.	Severe: slopes of 9 to 30 percent; vertical cuts subject to caving.	Severe: slopes of 9 to 30 percent; vertical cuts subject to caving.	Severe: slopes of 9 to 30 percent; erodible by wind and water. Area type better suited to steeper slopes than trench type.	Severe: slopes of 9 to 30 percent; erodible by wind and water.	Good: slopes of 9 to 30 percent; erodible by wind and water.

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Unsuited	Fair to a depth of 1 foot: medium texture; high fertility; good workability.	Poor: too clayey, wetness.	Very slow permeability; slight hazard of seepage; nearly level; low storage potential.	Fair to poor compaction characteristics; low permeability.	Very slow permeability; subject to occasional flooding; adequate drainage outlets unavailable in places.	High available water capacity; medium intake rate; very slow permeability; subject to occasional flooding.	Hazard of sedimentation in channels; drainage outlets unavailable in places.
Unsuited	Good: coarse texture; high fertility.	Good	Moderately slow permeability; nearly level to very gentle slopes; low storage potential.	Fair to good compaction characteristics; erodible by water on slopes; low permeability when properly compacted.	Moderately slow permeability; good surface drainage.	High available water capacity; moderate intake rate.	All features favorable.
Poor: limited uses because of gradation.	Poor: shallow depth; moderately coarse texture; low fertility; erodible by wind and water.	Good	Moderately rapid permeability.	Good compaction characteristics; medium permeability where properly compacted.	Moderately rapid permeability; well drained; good surface drainage.	High available water capacity; moderately rapid intake rate.	Moderately rapid permeability; nearly level to gentle slopes.
Poor: limited uses because of gradation.	Poor: shallow depth; moderately coarse texture; low fertility; erodible by wind and water.	Fair: slope.	Moderately rapid permeability.	Good compaction characteristics; medium permeability where properly compacted.	Moderately rapid permeability; good surface drainage.	High available water capacity; moderately rapid intake rate.	Moderately rapid permeability; gentle to moderate slopes.
Poor: possible source below a depth of 5 feet; limited uses because of gradation.	Poor: shallow depth; moderately coarse texture; low fertility; erodible by wind and water.	Poor: slope.	Moderately rapid permeability; low storage potential on moderate slopes.	Good compaction characteristics; medium permeability where properly compacted.	Moderately rapid permeability; good surface drainage.	Unsuited	Slopes of 9 to 30 percent; erodible by wind and water.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Hobbs: HhB, HhC, HkA, HkB, HkC, Hm.	Slight: subject to occasional flooding in places.	Severe: moderate permeability; subject to occasional flooding in places.	Slight	Severe: subject to occasional flooding in places; subject to frost action.	Slight: subject to occasional flooding in places.	Moderate: subject to frost action.	Good to fair: fair compaction characteristics; subject to frost action.
Holdrege: HnB, HoB, HoC, HoC2, HpC, HrD.	Moderate: moderate permeability.	Moderate: slopes as much as 9 percent in places; moderate permeability.	Slight	Moderate: low to moderate shrink-swell potential; subject to frost action.	Slight	Moderate: low to moderate shrink-swell potential; subject to frost action.	Good to fair: low to moderate shrink-swell potential; good compaction characteristics.
Hord: HsB, HtA, HtB, HxA, HxB.	Slight	Moderate: moderate permeability.	Slight	Moderate: low to moderate shrink-swell potential; subject to frost action.	Slight	Moderate: low to moderate shrink-swell potential; subject to frost action.	Fair: good compaction characteristics; subject to frost action.
Humbarger: Hz	Severe: seasonal high water table at a depth of 6 to 8 feet; sand and gravel at a depth of 4 feet; hazard of polluting ground water.	Severe: moderate permeability; coarse-textured substratum; hazard of polluting ground water.	Moderate: seasonal high water table at a depth of 6 to 8 feet; hazard of caving.	Severe: seasonal high water table at a depth of 6 to 8 feet; sand and gravel at a depth of 4 feet; hazard of caving; subject to frost action to a depth of 2 or 3 feet.	Severe: seasonal high water table at a depth of 6 to 8 feet; rapid permeability in lower part; hazard of polluting ground water.	Moderate: subject to frost action to a depth of 2 or 3 feet.	Good below a depth of 2.5 feet; fair in upper part with compaction control: subject to frost action.
Inavale: In	Severe: seasonal high water table at a depth of 6 to 10 feet; hazard of polluting ground water.	Severe: rapid permeability.	Moderate: seasonal high water table at a depth of 6 to 10 feet; hazard of caving.	Slight to a depth of 6 feet: seasonal high water table at a depth of 6 to 10 feet.	Severe: seasonal high water table at a depth of 6 to 10 feet; rapid permeability; hazard of polluting ground water.	Moderate: subject to soil blowing; poor surface unless paved.	Good: good compaction characteristics; erodible by wind and water.

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Unsuited	Good to a depth of 2 feet; medium texture; high fertility; good workability; slopes erodible.	Good	Moderate permeability; dugouts feasible if sealed.	Fair compaction characteristics; medium to low permeability where properly compacted.	Moderate permeability.	High available water capacity; moderate intake rate.	Slopes erodible.
Unsuited	Fair: best source in level areas; medium texture; high fertility; slopes erodible by water.	Good	Moderate permeability; nearly level to moderate slopes; low storage potential.	Good compaction characteristics; low permeability where properly compacted; subject to consolidation when loaded and saturated.	Moderate permeability; good surface drainage; slow to medium runoff.	High available water capacity; moderate intake rate.	Erodible by water.
Unsuited	Good: medium texture; high fertility.	Good	Moderate permeability; nearly level to very gentle slopes; low storage potential.	Good compaction characteristics; low permeability where properly compacted; erodible by water on slopes.	Moderate permeability; good surface drainage.	High available water capacity; moderate intake rate.	High siltation rate; other features favorable.
Good below a depth of 4 feet; seasonal high water table at a depth of 6 to 8 feet.	Good to a depth of 2 feet: medium texture; high fertility.	Good	Moderate permeability in upper part; sand below a depth of 4 feet; seasonal high water table at a depth of 6 to 8 feet.	Fair compaction characteristics; sand below a depth of 4 feet; seasonal high water table at a depth of 6 to 8 feet.	Moderate permeability in upper part; sand below a depth of 4 feet; seasonal high water table at a depth of 6 to 8 feet.	Moderate available water capacity; moderate to rapid intake rate; very rapid permeability below a depth of 4 feet.	Not needed.
Fair below a depth of 5 feet: limited uses because of gradation.	Poor: coarse texture; low fertility.	Poor: too sandy.	Rapid permeability; seasonal high water table at a depth of 6 to 15 feet.	Good compaction characteristics; medium permeability where properly compacted; subject to horizontal seepage.	Rapid permeability.	Low available water capacity.	Not needed.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Lawet: La, Lc, Ld, Le	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; rapid permeability in sandy part of soils; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving; subject to frost action.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; subject to frost action. Units Ld and Le have strong salinity and alkalinity.	Poor: seasonal high water table at a depth of 2 to 4 feet; sand at a depth of 2 to 4 feet.
Lb	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 1 to 3 feet; rapid permeability in sandy part of soils; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of caving.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of caving; subject to frost action.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 1 to 3 feet; subject to frost action.	Poor: seasonal high water table at a depth of 1 to 3 feet; sand at a depth of 2 to 4 feet.
Lawet variant: Lf.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 1 to 3 feet; very rapid permeability below a depth of 2.5 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of caving below a depth of 2.5 feet.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of caving below a depth of 2.5 feet; subject to frost action.	Severe: seasonal high water table at a depth of 1 to 3 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 1 to 3 feet; subject to frost action.	Fair: seasonal high water table at a depth of 1 to 3 feet; sand and gravel below a depth of 2.5 feet.
Lex: Lg, Lh	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; sand below a depth of about 2.5 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving below a depth of about 2.5 feet.	Severe: seasonal high water table at a depth of 2 to 4 feet; low to moderate shrink-swell potential; subject to frost action; basements not feasible. Unit Lh is strongly alkaline in many places.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; low shrink-swell potential; subject to frost action. Unit Lh is strongly alkaline in many places.	Poor: seasonal high water table at a depth of 2 to 4 feet. Unit Lh is strongly alkaline in many places.

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Good at a depth of 2 to 4 feet: limited uses because of gradation.	Poor to fair: seasonal high water table at a depth of 2 to 4 feet. Unit La contains lime; units Ld and Le have strong salinity and alkalinity.	Good for unit La and Lc; fair for units Ld and Le; alkalinity.	Moderate permeability; seasonal high water table at a depth of 2 to 4 feet.	Good compaction characteristics; seasonal high water táble at a depth of 2 to 4 feet. Units Ld and Le have strong salinity and alkalinity.	Seasonal high water table at a depth of 2 to 4 feet; moderate permeability; drainage outlets unavailable in places.	Low available water capacity; seasonal high water table at a depth of 2 to 4 feet. Units Ld and Le have strong salinity and alkalinity.	Terraces generally not needed; for diversions, see features for embankments.
Good at a depth of 2 to 4 feet: limited uses because of gradation.	Poor to fair: seasonal high water table at a depth of 1 to 3 feet; medium texture and fertility; contains lime.	Poor: wetness.	Moderate permeability; seasonal high water table at a depth of 1 to 3 feet.	Good compaction characteristics; seasonal high water table at a depth of 1 to 3 feet.	Seasonal high water table at a depth of 1 to 3 feet; moderate permeability; drainage outlets unavailable in places.	Low available water capacity; seasonal high water table at a depth of 1 to 3 feet.	Terraces generally not needed; for diversions, see features for embankments.
Good below a depth of 2.5 feet.	Poor: seasonal high water table at a depth of 1 to 3 feet; poorly drained.	Poor: wetness.	Moderate permeability in upper part; sand and gravel below a depth of 2.5 feet; seasonal high water table at a depth of 1 to 3 feet.	Good compaction characteristics; sand and gravel below a depth of 2.5 feet; seasonal high water table at a depth of 1 to 3 feet.	Seasonal high water table at a depth of 1 to 3 feet; very rapid permeability below a depth of 2.5 feet; drainage outlets unavailable in places.	Low available water capacity; seasonal high water table at a depth of 1 to 3 feet; rapid permeability below a depth of 2.5 feet.	Terraces generally not needed; for diversions, see features for embankments.
Good below a depth of 2.5 feet.	Fair to poor: seasonal high water table at a depth of 2 to 4 feet; medium texture; medium fertility. Unit Lh is strongly alkaline in many places.	Fair: thin layer.	Moderate permeability in upper part; sand below a depth of 2.5 feet; seasonal high water table at a depth of 2 to 4 feet. Unit Lh is strongly alkaline in many places.	Good compaction characteristics; sand has rapid permeability where properly compacted. Unit Lh is strongly alkaline in many places.	Moderate permeability in upper part; very rapid permeability below a depth of 2.5 feet; seasonal high water table at a depth of 2 to 4 feet; ditchbanks subject to caving. Unit Lh is strongly alkaline in many places.	Low available water capacity; seasonal high water table at depth of 2 to 4 feet; very rapid permeability below a depth of 2.5 feet. Unit Lh is strongly alkaline in many places.	Not needed.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Loup: Lo	Severe: seasonal high water table at a depth of 0 to 2 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 0 to 2 feet; rapid permeability; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 0 to 2 feet.	Severe: seasonal high water table at a depth of 0 to 2 feet; basements not feasible.	Severe: seasonal high water table at a depth of 0 to 2 feet; rapid permeability; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 0 to 2 feet.	Good: seasonal high water table at a depth of 0 to 2 feet.
Marsh: Ma. Too variable to be rated. Severe limitations for most uses due to excessive wetness.							
McCook: Mb, Mc	Severe: seasonal high water table at a depth of 4 to 15 feet; possible pollution of ground water. Unit Mb subject to occasional flooding.	Severe: seasonal high water table at a depth of 4 to 15 feet; sand below a depth of 3.5 feet; possible pollution of ground water. Unit Mb subject to occasional flooding.	Slight: vertical cuts in moist soil subject to caving.	Severe: seasonal high water table at a depth of 4 to 15 feet; vertical cuts in moist soil subject to caving; subject to frost action. Unit Mb subject to occasional flooding. Unit Mc is strongly alkaline.	Moderate for area type; severe for trench type: seasonal high water table at a depth of 4 to 15 feet; possible pollution of ground water. Unit Mb subject to occasional flooding.	Moderate: subject to frost action. Unit Mb subject to occasional flooding. Unit Mc is strongly alkaline.	Fair: seasonal high water table at a depth of 4 to 15 feet; subject to frost action; slopes erodible by water.
Muck: Mu. Too variable to be rated. Severe limitations for most uses due to excessive wetness.							
*Platte: Pa. For interpretations of Alda part, see Alda series.	Severe: seasonal high water table at a depth of 2 to 4 feet; very rapid permeability below a depth of 1.2 feet; severe hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; very rapid permeability below a depth of 1.2 feet; severe hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving; subject to frost action.	Severe: seasonal high water table at a depth of 2 to 4 feet; very rapid permeability below a depth of 1.2 feet; severe hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; subject to frost action.	Good: seasonal high water table at a depth of 2 to 4 feet; sand below a depth of 2 feet.

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Good below a depth of 2 feet.	Poor: medium to coarse texture; low fertility; seasonal high water table at a depth of 0 to 2 feet; poorly drained.	Poor: wetness.	Rapid permeability; seasonal high water table at a depth of 0 to 2 feet.	Good compaction characteristics; medium to high permeability where properly compacted.	Rapid permeability; seasonal high water table at a depth of 0 to 2 feet.	Not needed	Not needed.
Good below a depth of 3.5 feet; limited uses because of gradation.	Poor to fair: medium to moderately coarse texture; high fertility; slopes erodible by water. Unit Mc is strongly alkaline.	Good	Moderate permeability in upper part; sand below a depth of 3.5 feet; seasonal high water table at a depth of 4 to 15 feet. Unit Mc is strongly alkaline.	Good compaction characteristics; low permeability where soils from upper 3.5 feet are properly compacted; seasonal high water table at a depth of 4 to 15 feet. Unit Mc is strongly alkaline.	Moderate permeability in upper part; sand below a depth of 3.5 feet; seasonal high water table at a depth of 4 to 15 feet; slow runoff. Unit Mb is subject to occasional flooding. Unit Mc is strongly alkaline.	Moderate available water capacity; rapid permeability below a depth of 3.5 feet. Unit Mb subject to occasional flooding. Unit Mc is strongly alkaline.	Not needed.
Good below a depth of 2 feet.	Poor: shallow depth; low fertility.	Poor: wetness and thin layer.	Moderately rapid permeability in upper part; seasonal high water table at a depth of 2 to 4 feet; sandpits and dugouts feasible.	Good compaction characteristics; subject to seepage.	Moderately rapid permeability in upper part; very rapid permeability below a depth of 2 feet; seasonal high water table at a depth of 2 to 4 feet.	Unsuited	Not needed.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Riverwash: Ra. Too variable to be rated. Severe limitations for most uses due to frequent flooding.							
Rough broken land, loess: Rb.	Severe: slopes of 15 to 60 percent.	Severe: slopes of 15 to 60 percent.	Severe: slopes of 15 to 60 percent.	Severe: slopes of 15 to 60 percent.	Severe: slopes of 15 to 60 percent.	Severe: slopes of 15 to 60 percent.	Good: needs compaction control; erodible by water; poor locations for borrow areas.
Scott: Sc	Severe: very slow permeability; subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding; high shrink-swell potential; highly susceptible to frost action.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding; high shrink-swell potential; highly susceptible to frost action.	Poor: high shrink-swell potential; highly susceptible to frost action.
Silver Creek: Se, Su.	Severe: seasonal high water table at a depth of 3 to 5 feet; slow permeability; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 3 to 5 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 3 to 5 feet.	Severe: seasonal high water table at a depth of 3 to 5 feet; high shrink-swell potential; highly susceptible to frost action.	Severe: seasonal high water table at a depth of 3 to 5 feet; hazard of polluting ground water.	Moderate: seasonal high water table at a depth of 3 to 5 feet; high shrink-swell potential; highly susceptible to frost action.	Poor: poor workability; poor compaction characteristics; seasonal high water table at a depth of 3 to 5 feet limits depth of borrow areas; sand below a depth of 4 feet.
Slickspots: mapped only in unit Le in Lawet series. Too variable to be rated. Severe limitations for most uses due to strong and very strong alkalinity.							

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Unsuited	Generally unsuited.	Poor: slope.	Moderate permeability; steep to very steep slopes.	Good compaction characteristics; borrow areas difficult to vegetate.	Moderate permeability; not suited to crops.	Unsuited	Not needed.
Unsuited	Poor: shallow depth; medium texture fertility.	Poor: too clayey, wetness.	Very slow permeability; subject to frequent flooding.	Poor compaction characteristics; low permeability of compacted soil.	Very slow permeability; subject to frequent flooding; adequate drainage outlets unavailable in places.	Moderate available water capacity; slow intake rate; very slow permeability; adequate drainage outlets unavailable in places.	Unsuited.
Fair below a depth of 4 feet: overburden difficult to transport in places.	Fair to poor: medium texture; high fertility; high plasticity below a depth of 1 foot. Unit Su is strongly alkaline.	Poor: too clayey.	Slow permeability; seasonal high water table at a depth of 3 to 5 feet.	Poor compaction characteristics; low permeability of compacted soil. Unit Su is strongly alkaline.	Slow permeability; seasonal high water table at a depth of 3 to 5 feet. Unit Su is strongly alkaline.	Moderate available water capacity; slow intake rate; slow permeability. Unit Su is strongly alkaline.	Unsuited.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Degree and kind of limitation for—						Suitability as source for—
	Septic-tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfill	Local roads and streets	Road fill
Uly: UaC2, UaD, UcD, UeE.	Slight for slopes of less than 9 percent; moderate for slopes of more than 9 percent.	Moderate: slopes of 3 to 20 percent; moderate permeability.	Slight for slopes of less than 9 percent; moderate for slopes of more than 9 percent; vertical cuts in moist soil subject to caving.	Slight for slopes of less than 9 percent; moderate for slopes of more than 9 percent; vertical cuts in moist soil subject to caving; subject to frost action.	Slight. Area type better suited to the steeper slopes than trench type.	Slight for slopes of less than 9 percent; moderate for slopes of more than 9 percent; subject to frost action; steeper slopes erodible by water.	Good to fair: needs compaction control; erodible by water; slopes of 9 to 20 percent in unit UeE.
Valentine: VaE, VbB, VbE, VcF.	Slight for slopes of less than 8 percent; moderate for slopes of 8 to 15 percent; severe for slopes of more than 15 percent; hazard of polluting ground water.	Severe: slopes of 0 to 60 percent; rapid permeability; hazard of polluting ground water.	Severe: slopes of 0 to 60 percent; subject to caving and blowouts.	Slight for slopes of less than 8 percent; moderate for slopes of 8 to 15 percent; severe for slopes of more than 15 percent; subject to caving.	Severe: slopes of 0 to 60 percent; rapid permeability; hazard of polluting ground water.	Slight for slopes of less than 8 percent; moderate for slopes of 8 to 15 percent; severe for slopes of more than 15 percent; erodible by wind and water.	Good for slopes of less than 25 percent; fair for slopes of more than 25 percent; highly erodible by wind and water where unprotected.
Vetal: VeB	Slight	Moderate: moderately rapid permeability.	Slight: hazard of caving where moist.	Slight	Slight	Slight to moderate: moderate shrink-swell potential below a depth of 3.3 feet.	Good to fair: low to moderate shrink-swell potential; needs compaction control; slopes erodible by wind and water.
Wann: Wb, Wf, Wm	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; moderately rapid permeability; hazard of polluting ground water.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving.	Severe: seasonal high water table at a depth of 2 to 4 feet; hazard of caving; subject to frost action.	Severe: seasonal high water table at a depth of 2 to 4 feet; moderately rapid permeability; hazard of polluting ground water.	Moderate: seasonal high water table at a depth of 2 to 4 feet; subject to frost action.	Poor: seasonal high water table at a depth of 2 to 4 feet.
Wet alluvial land: Wx. Too variable to be rated. Severe limitations for most uses due to frequent flooding.							

properties of the soils—Continued

Suitability as source for—Continued			Soil features affecting—				
Sand	Topsoil	Cover soil for area type landfill	Reservoir areas	Embankments, dikes, and levees	Drainage of cropland and pasture	Irrigation	Terraces and diversions
Unsuited	Fair to poor: shallow depth; medium texture and fertility; erodible by water; slopes of 9 to 20 percent in unit UeE.	Good for slopes less than 8 percent; fair for slopes 8 to 15 percent; poor for slopes of more than 15 percent.	Moderate permeability.	Fair compaction characteristics; medium to low permeability where properly compacted.	Moderate permeability; medium to rapid runoff; slopes of 9 to 20 percent in unit UeE not suited to crops.	High available water capacity; moderate intake rate; slopes of 9 to 20 percent in unit UeE unsuited.	Slopes erodible by water. Unit UeE unsuited.
Good: limited uses because of gradation.	Poor: shallow depth; coarse texture; low fertility.	Poor: too sandy.	Rapid permeability; subject to high seepage.	Good compaction characteristics; highly erodible by wind and water where unprotected; medium to high permeability of compacted soil.	Rapid permeability.	Low available water capacity; rapid permeability; potential limited to nearly level to gentle slopes.	Not needed.
Poor: generally unsuited.	Good to fair: moderately coarse texture; high fertility; slopes erodible by wind and water.	Good	Moderately rapid permeability in upper 3 feet.	Fair compaction characteristics; medium permeability where properly compacted; slopes erodible by wind and water.	Moderately rapid permeability in upper 3 feet; moderate permeability in lower part; slow runoff.	High available water capacity; moderately rapid intake rate; moderate permeability below a depth of 3 feet; slopes erodible by wind and water.	Moderately coarse texture; moderately rapid permeability in upper 3 feet.
Fair below a depth of 5 feet.	Fair to a depth of 1.2 feet: moderately coarse texture; medium fertility. Poor for unit Wf: saline and alkaline.	Good	Moderately rapid permeability; seasonal high water table at a depth of 2 to 4 feet.	Fair compaction characteristics; medium permeability where properly compacted; subject to horizontal seepage.	Moderately rapid permeability; seasonal high water table at a depth of 2 to 4 feet; ditchbanks unstable in places. Unit Wf is saline and alkaline.	High available water capacity; moderately rapid intake rate. Unit Wf is saline and alkaline.	Unsuited.

TABLE 7.—*Engineering*

[Tests performed by the Nebraska Department of Roads in accordance with standard

Soil name and location	Parent material	Report number	Depth	Specific gravity	Mechanical analysis [1] Percentage passing sieve		
					3/4 in.	3/8 in.	No. 4 (4.7 mm.)
			Inches				
Anselmo fine sandy loam:							
100 feet E. and 0.48 mile S. of the NW. corner of sec. 15, T. 16 N., R. 23 W. (Modal profile)	Eolian sand and silt	S71-1165	7-15	2.65			
		S71-1166	15-23	2.67			
		S71-1167	32-60	2.68			
Cozad silt loam:							
165 feet S. and 0.3 mile W. of the NE. corner of sec. 2, T. 12 N., R. 29 W. (Clay percentage in subsoil is minimal)	Alluvium	S71-1149	6-11	2.62			
		S71-1150	11-15	2.66			
		S71-1151	21-60	2.65			
Holdrege silt loam:							
100 feet W. and 0.15 mile N. of the SE. corner of sec. 35, T. 10 N., R. 29 W. (Modal profile)	Peoria loess	S71-1155	6-10	2.65			
		S71-1156	16-23	2.68			
		S71-1157	23-33	2.68			
Hord silt loam:							
100 feet N. and 0.1 mile W. of the SE. corner of sec. 3, T. 12 N., R. 27 W. (Modal profile)	Alluvium	S71-1162	5-16	2.62			
		S71-1163	34-39	2.67			
		S71-1164	49-60	2.71			
Lawet silt loam:							
100 feet E. and 0.2 mile N. of the SW. corner of sec. 29, T. 13 N., R. 28 W. (Modal profile)	Alluvium	S71-1139	6-19	2.63			
		S71-1140	19-25	2.68			
		S71-1141	25-34	2.67			
Platte loam:							
0.1 mile W. and 0.2 mile S. of the NE. corner of sec. 18, T. 12 N., R. 27 W. (Modal profile)	Alluvium	S71-1145	0-7	2.62			
		S71-1146	14-60	2.65	100	99	97
Silver Creek silt loam:							
100 feet N. and 0.25 mile W. of the SE. corner of sec. 29, T. 14 N., R. 31 W. (Modal profile)	Alluvium	S71-1142	0-5	2.56			
		S71-1143	18-28	2.67			
		S71-1144	34-39	2.69		100	99
Uly silt loam:							
150 feet E. and 0.22 mile N. of the SW. corner of sec. 16, T. 9 N., R. 26 W. (Modal profile)	Peoria loess	S71-1152	0-9	2.63			
		S71-1153	9-15	2.67			
		S71-1154	23-60	2.66			
Valentine fine sand:							
0.25 mile N. and 0.18 mile E. of the SW. corner of sec. 7, T. 15 N., R. 30 W. (Modal profile)	Eolian sand	S71-1147	2-6	2.63			
		S71-1148	14-60	2.65			

[1] Mechanical analysis according to AASHTO Designation: T88-47 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil-survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded in calculating grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

is also important. Engineering properties of the soil, as interpreted from the Unified Soil Classification, affect the embankment. Rocks and stones in the soil adversely influence the ease of excavation and compaction of the embankment material.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet. These include excavations for pipelines, sewerlines, telephone and transmission lines, basements, open ditches, and cemeteries. Good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding or a high water table are desirable properties of soils to be used for excavations.

Dwellings, as rated in table 6, are not more than three stories high and are supported by foundations or footings placed in undisturbed soil. Properties that affect the rating of a soil for dwellings are those that relate to capacity to support loads and to resist settlement under load and those

test data

procedures of the American Association of State Highway Officials (AASHTO)]

Mechanical analysis [1]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHTO [2]	Unified [3]
								Percent			
100	98	90	50	35	23	18	14	25	7	A-4(3)	SM-SC.
100	99	93	50	37	23	17	16	24	6	A-4(3)	SM-SC.
100	97	79	49	33	20	18	13	22	4	A-4(3)	SM-SC.
----------	----------	100	90	70	31	19	19	32	7	A-4(8)	ML-CL.
----------	----------	100	92	80	36	23	18	35	12	A-6(9)	CL-ML.
----------	----------	100	84	60	24	15	12	27	3	A-4(8)	ML-CL.
----------	----------	100	92	84	36	25	21	34	12	A-6(9)	CL-ML.
----------	----------	100	91	68	37	26	21	37	16	A-6(10)	CL.
----------	----------	100	87	64	32	20	17	31	9	A-4(8)	CL-ML.
----------	100	99	90	76	34	23	20	32	9	A-4(8)	ML-CL.
----------	100	99	79	53	36	27	23	34	15	A-6(10)	CL.
----------	100	99	87	61	35	22	18	29	8	A-4(8)	CL-ML.
100	98	95	60	52	38	22	16	35	14	A-6(7)	CL.
100	99	96	60	52	42	30	24	30	13	A-6(6)	CL.
100	99	96	69	60	43	32	26	35	18	A-6(10)	CL.
100	91	82	40	31	20	11	8	26	2	A-4(1)	SM.
92	58	32	3	3	3	3	2	(4)	(4)	A-3(3)	SP.
100	98	93	63	48	28	16	11	41	7	A-5(6)	ML.
100	96	93	80	76	63	49	41	63	40	A-7-6(25)	CH.
96	83	76	64	57	43	31	28	54	35	A-7-6(18)	CH.
----------	----------	100	94	87	33	23	18	37	12	A-6(9)	ML-CL.
----------	----------	100	96	91	40	25	20	40	17	A-7-5(11)	CL.
----------	----------	100	96	90	39	23	15	34	10	A-4(8)	ML-CL.
100	93	75	8	7	4	3	3	(4)	(4)	A-3(-2)	SP-SM.
100	94	72	7	4	4	3	3	(4)	(4)	A-3(-2)	SP-SM.

[2] Based on AASHTO designation: M 145-49 (*1*).
[3] Based on the Unified Soil Classification System (*2*).
[4] Nonplastic.

that relate to ease of excavation. Wetness of the soil, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential affect the capacity to support loads. Wetness, slope, depth to bedrock, and the presence of stones and rocks affect ease of excavation.

Sanitary landfill is a method of disposing of refuse. Both the trench and area types of landfill are considered in table 6. In each type, the waste is spread in thin layers, compacted, and covered with soil at intervals throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. The best soils for landfill have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. The possible hazard of polluting the ground water is a consideration that affects the suitability of a soil for landfill. Unless otherwise stated, the ratings in table 6 apply only to soil material within a depth of 5 feet. Therefore, limitations rated *slight* or *moderate* may not be valid if trenches are to be much deeper than that. Before any site is considered suitable

for a sanitary landfill, the soils at the site should be investigated. In places, reliable predictions of soil properties can be made for a depth of 10 or 15 feet.

Local roads and streets, as rated in table 6, are all-weather roads that are expected to carry automobile traffic all year. They have a subgrade of soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water, and they have ordinary provisions for drainage. They are built mainly from the soil at hand, and most cuts and fills are less than 6 feet deep. The design and construction of roads and streets are affected by the load supporting capacity and stability of the subgrade and by the workability and quantity of available cut and fill material. The AASHTO and Unified classifications of the soil material and the shrink-swell potential indicate traffic supporting capacity. Wetness and flooding affect stability of the material. The slope and wetness of the soil, depth to hard rock, and the presence of stones and rocks affect the ease of excavation and the amount of cut and fill needed to obtain an even grade.

Road fill is soil material used in embankments for roads. The suitability ratings in table 6 reflect the predicted performance of the soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage, and the relative ease of excavating the material at borrow areas.

Sand is used in large quantities in many kinds of construction. The ratings in table 6 indicate probable sources for this material. A soil rated *good* or *fair* generally has a layer of sand that is at least 3 feet thick and the top of the layer is within a depth of 5 feet. The ratings do not take into account the thickness of overburden, the location of the water table, or other factors that affect mining of the materials, and neither do they indicate the quality of the deposit.

Topsoil is used for preparing a seedbed or for topdressing an area where vegetation is to be established and maintained. The suitability of a soil as topsoil depends mainly on the ease of working and spreading the soil material, on the natural fertility of the material or the response of plants when fertilizer is applied, and on the absence of substances toxic to plants. To a lesser degree, suitability is affected by the texture of the soil material and the presence of stone fragments. Damage that will result at the area from which topsoil is taken also is considered in the ratings in table 6.

Reservoirs hold water behind a dam or embankment. Soils suitable for reservoir areas have a low seepage potential. The permeability of a soil and the depth to fractured or permeable bedrock or other permeable material affect seepage.

Embankments, dikes, and levees require soil material that has high stability, shear strength, compactibility, and low shrink-swell potential. The soil material needs to be resistant to seepage and piping. The presence of stones or organic material in the soil is undesirable.

Drainage of cropland and pasture is affected by the permeability, slope, texture, salinity or alkalinity, and structure of the soil; the depth to claypan, rock, or other layers that influence the rate of water movement; the depth to the water table; the stability of soil material in ditchbanks; the susceptibility of the area to stream overflow; and the availability of outlets for drainage.

The suitability of a soil for *irrigation* is affected by the slope, texture, and available water capacity of the soil; susceptibility of the area to stream overflow, water erosion, or soil blowing; presence of stones and accumulations of salts and alkali in the soil; depth to the root zone; rate of water intake at the surface; permeability of soil layers below the surface layer or of layers that restrict movement of water; depth to the water table or bedrock; and the need for drainage.[7]

Terraces and diversions are embankments or ridges constructed across the slope to intercept runoff, which then soaks into the soil or flows slowly to a prepared outlet. Features that affect the suitability of a soil for terraces are uniformity and steepness of slope, depth to bedrock or other unfavorable material, presence of stones, permeability, and resistance to water erosion, soil slipping, and soil blowing. Soils suitable for terraces and diversions are easily vegetated and have outlets for runoff.

Engineering test data

Samples of nine of the soil series in Lincoln County were tested to help evaluate those soils for engineering purposes. Data from the tests are given in table 7. The engineering classifications given in the last two columns of the table are based on data obtained by mechanical analyses and on tests to determine the liquid limits and plastic limits. The mechanical analyses were made by a combination of the sieve and hydrometer methods. As explained in the section "Soil Properties Significant to Engineering," tests for liquid limit and plastic limit measure the effect of water on the consistence of soil material.

Specific gravity, as given for the soils in table 7, is a measure of, or means of expressing, the heaviness of soil. It is the ratio of the weight per unit volume of the solid particles of a soil to the weight per unit volume of water. This measure of the solid particles of a soil, exclusive of the void spaces, sometimes is referred to as the "true" or "real" specific gravity. The density of a soil is proportional to the specific gravity.

Formation and Classification of the Soils

The first part of this section describes the factors that have affected formation and development of soils in Lincoln County. The second explains the system of soil classification currently used and classifies each soil series of the county according to that system.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on parent material that accumulated through weathering of rock. The characteristics of soil at any given place are determined by (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material accumulated and existed since accumulation, (3) the plant and animal life on and in the soil since the beginning of its formation, (4) the relief, or lay of the land, and (5) the length of time that forces of soil formation acted on the soil material. These five factors of soil formation are closely

[7] For further information on the use of soils for irrigation, see "Irrigation Guide for Nebraska," Soil Conservation Service, 1971.

interrelated in their effects on the soil. Few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. Moreover, many of the processes of soil development are only poorly understood.

The parent material affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Climate and plant and animal life act on the parent material and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. Usually, long periods of time are needed for changing the parent material into a soil profile and for differentiating the soil into distinct horizons.

Parent material

Parent material is the disintegrated and partly weathered rock in which soil forms. It determines the mineralogical and chemical composition of the soil. The soils of Lincoln County developed in five kinds of parent material: eolian sand, loess (wind-deposited silt), upland deposits of sand and gravel, residuum weathered from limy siltstone and limy sandstone, and stream alluvium.

Eolian sand, the principal parent material in Lincoln County, consists of pale-brown to very pale brown sandy material that was deposited by wind. This material ranges in thickness from less than a foot to many feet. The thickest deposits are in the northern part of the county. Soils formed in eolian sand are mostly coarse textured and excessively drained. However, they consist in some places of somewhat excessively drained fine sand to medium sand and in other places of sand containing silt and clay. Valentine soils formed in coarse eolian sand in the sandhills and are mostly gently rolling to hilly. They are immature soils having a thin surface layer and lacking well-developed horizons. Anselmo, Hersh, and Dunday soils formed in sandy to loamy eolian material in valleys, in the sandhills or in transition areas between the eolian sand and silty loess. Vetal soils, which occur in depressions in the sandhills, formed in eolian material containing very fine sand, silt, and clay.

Loess mantles most of the dissected area in the southeastern part of the county and also the tableland remnants in the southwestern and northeastern parts. Three different episodes of loess deposition are evident. The oldest loess, which is reddish brown, is exposed along canyon walls in the southeastern part of the county. Overlying this is light-gray to very pale brown loess that is silt loam or very fine sandy loam in texture and which ranges in thickness from less than a foot to nearly a hundred feet. This loess forms the land surface in much of the upland area that is not mantled by eolian sand. In transitional areas between the sand hills and the loess hills is a thin younger loess that has a higher content of very fine sand and commonly is light gray. Some of the soils on ridges and tableland remnants in the southeastern part of the county formed in this wind-deposited material. Soils formed in loess are well drained except for those in swales and depressions. Holdrege, Hord, Cozad, and Hall soils formed in loess on nearly level to rolling slopes; Scott and Fillmore soils formed in depressions within loess areas; and Coly and Uly soils formed in loess on some of the steepest slopes in the county.

Water-deposited sand and gravel, 5 to 20 feet thick, on the upland remnant between the valleys of the North Platte and South Platte Rivers and along the valley slope east of Birdwood Creek, is the parent material for Dix soil. This is a gently sloping to steep, excessively drained soil that is 10 to 20 inches deep over the sand and gravel.

Residuum weathered from bedrock strata consisting of limy siltstone and limy sandstone is the surface or near-surface soil material on the north and south side slopes of the narrow upland between the North Platte and South Platte Rivers and in several places on the south side of the South Platte and Platte River valleys. Much of the area of this material is very thinly mantled by loess, and scattered within the area are outcrops of indurated strata that are as much as 25 percent lime carbonate. Known locally as "mortar beds," these indurated strata are difficult to penetrate with hand tools but can be worked with heavy equipment. Creighton soils are the only soils in Lincoln County that formed in the residuum weathered from underlying bedrock.

Alluvium is sediment deposited by flood waters on bottom lands, stream terraces, and foot slopes. In Lincoln County, it ranges from fine sand to clay in texture, the range being wide over short distances, especially along the flood plain in the Platte Valley. Because most surficial alluvial deposits are geologically young, soils formed in them generally are immature, or weakly developed. Bankard variant, Elsmere, Inavale, and Loup soils formed in sandy alluvium. Alda, Cass, and Wann soils formed in loamy alluvium. Caruso, Hobbs, Humbarger, Lawet, Lex, McCook, Platte, and Silver Creek soils formed in silty to clayey alluvium. Alda and Lex soils are 20 to 40 inches deep over sand and gravel, and Platte soils are 10 to 20 inches deep over sand and gravel. Alluvial soils are excessively drained (Inavale soils) to poorly drained (Loup and Lawet soils).

Climate

Climate affects the formation of soils through its influence on the rate of weathering and reworking of parent materials by temperature, wind, and rainfall. Mechanical disintegration of the parent material is hastened by alternate freezing and thawing. Chemical weathering is accelerated by heat and humidity in summer. Soil materials are transported from one place to another by wind. They are also shifted, sorted, and reworked by running water.

As soils continue to develop, precipitation infiltrating the surface layer leaches free lime to the subsoil and underlying material. Because soils in the western part of the county receive slightly less moisture than those in the eastern part, free lime is nearer to the surface in the western soils. Infiltrating precipitation also transports clay colloids downward from the surface layer, and as a result the clay content in the subsoil has increased in some of the upland soils.

Climate affects the fertility and tilth of soils. The amount of moisture, the length of the growing season, and the prevailing temperature during the growing season affect the vegetation, which is the principal source of organic matter in soils. These same factors directly affect the activity of micro-organisms that convert organic matter to humus. The main source of organic matter is from plant residue, but decaying bodies of animals and insects that were sustained by the soil also contribute to the organic-matter content. Freezing of moist soils in winter generally improves their workability in spring. Wind is an important factor in that it can remove the top layer of some soils and can deposit a mantle of sediment on other soils. Hot wind in summer can have a drying effect on soils.

Plant and animal life

Plants, animals, fungi, bacteria, earthworms, insects, and other organisms are important and active in soil-forming processes. The plants and animals that live in and on the soil are affected in turn by the other soil-forming factors: climate, relief, time, and parent material.

Vegetation supplies organic matter, which affects the physical and chemical properties of the soil. It adds bulk, thereby decreasing the density and improving the tilth. The native plants in Lincoln County consist mostly of tall, medium, and short grasses. These grasses provide organic matter that, over a long period of time, results in the formation of a friable, dark-colored surface layer. Different kinds and amounts of organic matter are produced by trees and aquatic plants. The trees grow in narrow bands along streams and in scattered stands in the principal valleys. Aquatic plants are abundant in the wet, marshy areas along the Platte River and along headwaters of streams that originate in the sandhills.

When plants die, micro-organisms, fungi, and small animals act upon the organic matter and decompose it into stable humus. Bacteria in the roots of certain legumes remove nitrogen from the air and, when the bacteria die, the nitrogen becomes available in the soil. Earthworms, insects, and small burrowing animals affect the formation of soils by mixing and working the organic and mineral matter. The mixing and working speed soil development and make the soil more friable.

Man also affects the formation of soils. He determines, by the kind of management he uses, whether the soil is conserved or lost through erosion, whether fertility is maintained, and what kinds of vegetation are dominant. Man directly affects the future direction and rate of soil formation through his control of runoff and his management practices of the land.

Relief and drainage

Relief, or lay of the land, influences the formation of soil mainly through its effect on runoff, drainage, and vegetative growth. The degree of slope, shape of the surface, and permeability of the soil determine the rate of runoff, the internal drainage, and the moisture content of the soil. Internal drainage and availability of moisture are important factors in forming the horizons of a soil.

On steep slopes, such as those in the southeastern part of the county, runoff is rapid, little moisture penetrates the soil, and development of the soil is slower than on gentler slopes. Erosion removes the surface soil almost as fast as it is formed. Lime and other elements are not leached deeply. In Lincoln County, Coly silt loam, 15 to 30 percent slopes, has little soil profile development and lime carbonate occurs in the surface layer.

In the sandhills, little or no runoff occurs. The soils are excessively drained, but soil horizons are weakly formed and indistinct because the coarse sandy material is highly resistant to chemical weathering. Lime carbonate has been leached very deeply.

The nearly level and gently sloping soils on loess uplands have stronger development and more distinct soil horizons than the steeper soils. They absorb more moisture, and percolation is deeper into the profile. Lime and plant nutrients are leached to greater depths. The nearly level to gently sloping Holdrege silt loam, 1 to 3 percent slopes, has distinct horizons. It has a thicker and finer textured subsoil than the moderately sloping Uly silt loam, 7 to 9 percent slopes.

Soils in depressions on the uplands, such as Scott soils, are poorly drained. Moisture readily percolates through the soil and soil development is strong. These soils have an A2 horizon and a claypan, or claypanlike, B horizon.

Some of the nearly level soils on bottom lands and stream terraces are somewhat poorly drained because of slow runoff or a moderately high water table. Where runoff is slow, water penetrates the soil, facilitates weathering, and leaches certain elements into lower horizons. Where the water table is moderately high, water is brought from the zone of saturation to the root zone by capillary action and is used by plants. The moisture in the soil affects the kind and amount of vegetation, which in turn influences soil development. Elsmere, Platte, Alda, and other soils on bottom lands are subject to flooding. Soil development in areas subject to flooding is affected by the sediment deposited by each overflow and is influenced by the vegetation, which is restricted to water-tolerant grasses.

Time

Time is needed for the active agents of soil development to form soils from parent material. Some soils form much more rapidly than others. The length of time for a particular soil to form depends on the other factors involved.

Immature soils or land types lack well-defined horizons because they have been exposed to soil-forming factors for only a short period of time. Hobbs, Valentine, Platte, and Hersh soils are some of the youngest soils in Lincoln County. Formed in recently deposited alluvium or in recently reworked eolian material, they have only weakly developed horizons. Coly soils also show little development, although they are among the oldest soils in the county. The steep topography has had a stronger influence on the development of these soils than time.

Older immature soils have a well-developed, darkened surface layer but lack a well-developed subsoil horizon. Cozad, Hord, and Uly soils are intermediate in age. They formed in colluvial-alluvial material or in loess and have a thin, weakly developed B horizon.

Old or mature soils have well-developed genetic horizons. Soil materials in which these soils formed have been in place long enough for climate, plant and animal life, and relief to alter the parent material. The B horizon commonly is finer textured than the material from which it formed. Holdrege and Hall soils are mature soils that have a well-developed B horizon. Fillmore and Scott soils have a more strongly developed B horizon than Holdrege or Hall soils, not because they developed over a longer period of time but because of the greater moisture supply.

Classification of the Soils

Soils are classified so that we can more easily distinguish their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us understand their behavior and their response to manipulation. Through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

In a classification system, soils are placed in broad categories to facilitate study and comparison in large areas,

such as countries and continents. These broad categories are divided and subdivided into narrower classes that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing agricultural land and woodland, in developing rural areas, in engineering work, and in many other ways. The system of classifying soils that is currently used was adopted by the National Cooperative Soil Survey in 1965. This system is under continual study, and readers interested in the latest developments of the system should refer to the available literature (*3*, *6*).

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, suborder, great group, subgroup, family, and series. In this system, the criteria used as a basis for classification are soil properties that are observable or measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The same property or subdivisions of this property can be used in several different categories. Table 8 shows the classification of each soil series in Lincoln County by family, subgroup, and order according to the present system, which is current as of January 1, 1974. Classes of the current system are defined briefly in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties that differentiate these orders generally are those that tend to give broad climatic groupings of soils. However, three of the orders—the Entisols, Histosols, and Vertisols—occur in many different climates. The name of each order is a three or four syllable word ending in *sol* (for example, Moll-i-sol).

SUBORDER. Each order is divided into suborders on the basis of soil characteristics that seem to produce classes having the greatest genetic similarity. A suborder has a narrower climatic range than an order. The soil properties used to separate suborders are mainly those that reflect the presence or absence of a water table at a shallow depth; the climate of the soil; the accumulation of clay, iron, or organic carbon in the upper solum; the cracking of the soil caused by a decrease in soil moisture; and fine stratification. The first syllable of the name of each suborder indicates a soil property and the second, or last, shows the order. For example, *Aqu* in the name Aquoll indicates water or wetness in the soil and *oll* shows the order is Mollisol.

GREAT GROUP. Soil suborders are divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, carbonates, and other constituents have accumulated or have been removed; or those that contain a claypan that interferes with the growth of roots, movement of water, or both. Among features considered are the acidity, climate, composition, and color of the soil. The name of each great group is made by adding a

TABLE 8.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Alda	Coarse-loamy, mixed, mesic	Fluvaquentic Haplustolls	Mollisols.
Anselmo	Coarse-loamy, mixed, mesic	Typic Haplustolls	Mollisols.
Bankard, variant	Sandy, mixed, mesic	Ustic Torrifluvents	Entisols.
Caruso	Fine-loamy, mixed, mesic	Fluvaquentic Haplustolls	Mollisols.
Cass	Coarse-loamy, mixed, mesic	Fluventic Haplustolls	Mollisols.
Cass variant	Coarse-loamy, mixed, mesic	Fluventic Haplustolls	Mollisols.
Coly	Fine-silty, mixed (calcareous), mesic	Typic Ustorthents	Entisols.
Cozad	Fine-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Cozad variant	Coarse-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Creighton [1]	Coarse-loamy, mixed, mesic	Aridic Haplustolls	Mollisols.
Dix [1]	Sandy-skeletal, mixed, mesic	Torriorthentic Haplustolls	Mollisols.
Dunday	Sandy, mixed, mesic	Entic Haplustolls	Mollisols.
Elsmere	Sandy, mixed, mesic	Aquic Haplustolls	Mollisols.
Fillmore	Fine, montmorillonitic, mesic	Typic Argialbolls	Mollisols.
Hall	Fine-silty, mixed, mesic	Pachic Argiustolls	Mollisols.
Hersh	Coarse-loamy, mixed, nonacid, mesic	Typic Ustorthents	Entisols.
Hobbs	Fine-silty, mixed, nonacid mesic	Mollic Ustifluvents	Entisols.
Holdrege	Fine-silty, mixed, mesic	Typic Argiustolls	Mollisols.
Hord	Fine-silty, mixed, mesic	Cumulic Haplustolls	Mollisols.
Humbarger	Fine-loamy, mixed, mesic	Cumulic Haplustolls	Mollisols.
Inavale	Sandy, mixed, mesic	Typic Ustifluvents	Entisols.
Lawet	Fine-loamy, mesic	Typic Calciaquolls	Mollisols.
Lawet variant	Fine-loamy, over sandy or sandy-skeletal, mesic	Typic Calciaquolls	Mollisols.
Lex	Fine-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic	Fluvaquentic Haplaquolls	Mollisols.
Loup	Sandy, mixed, mesic	Typic Haplaquolls	Mollisols.
McCook [2]	Coarse-silty, mixed, mesic	Fluventic Haplustolls	Mollisols.
Platte	Sandy, mixed, mesic	Mollic Fluvaquents	Entisols.
Scott	Fine, montmorillonitic, mesic	Typic Argialbolls	Mollisols.
Silver Creek	Fine, mixed (calcareous), mesic	Typic Haplaquolls	Mollisols.
Uly	Fine-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Valentine	Mixed, mesic	Typic Ustipsamments	Entisols.
Vetal	Coarse-loamy, mixed, mesic	Pachic Haplustolls	Mollisols.
Wann	Coarse-loamy, mixed, mesic	Fluvaquentic Haplustolls	Mollisols.

[1] These soils are typically in the usually dry (Aridic) area. They have been named as taxadjuncts in this survey because some part of their moisture control section is dry for fewer days than specified for the series.

[2] McCook loam (Mb) is a taxadjunct to the series because carbonates are lower in the profile and because the percentage of clay in the control section is lower than specified in the range for the series.

defining prefix of one or two syllables to the name of the suborder. For example, *Hapl* in the name Haplaquoll indicates the soil has simple horizons and that *aquoll* is the suborder.

SUBGROUP. Great groups are divided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups also are made in instances where soil properties intergrade outside the range of any other great group, suborder, or order. The name of each subgroup is derived by placing one or more adjectives before the name of the great group. For example, the name Typic Haplaquoll means that the soil is a typical Haplaquoll.

FAMILY. Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, soil depth, and consistence. The name of a family consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and other properties that are used to differentiate family as, for example, the sandy, mixed, mesic family of Typic Haplaquolls (table 8).

SERIES. Families are divided into smaller groups called series. A series consists of a group of soils that formed from a particular kind of parent material having genetic horizons which, except for the texture of the surface soils, are similar in differentiating characteristics and in arrangement in the profile. Among these characteristics are color, texture, structure, consistence, reaction, and mineralogical and chemical composition. A series commonly is named after the geographical location at or near the place where the series was first observed and mapped.

Regional Soil Differences

In general, soils of similar genesis within a county closely resemble each other and are similar in use and management. This is because the differences in climate and the associated soil characteristics are slight within a relatively small area.

Lincoln County is on the western edge of the area of soils classified as Typic Ustolls and associated soils. The drier soils in the western part of the county can be classified as Aridic Ustolls and associated soils. However, because these drier soils are very limited in extent and because they closely resemble corresponding soils in the remainder of the county, they are classified as Typic Ustolls and associated soils. These soils are listed below as they are recognized in Lincoln County together with their counterparts in the Aridic Ustolls and associated soils.

Typic Ustoll Area		*Aridic Ustoll Area (SW. Lincoln Co.)*	
Series	*Classification*	*Series*	*Classification*
Anselmo	Typic Haplustolls	Colby	Ustic Torriorthents
Coly	Typic Ustorthents	Bridget	Torriorthentic Haplustolls
Cozad	Typic Haplustolls		
Dunday	Entic Haplustolls	Dailey	Torriorthentic Haplustolls
Hall	Pachic Argiustolls		
Hersh	Typic Ustorthents	Goshen	Pachic Argiustolls
Holdrege	Typic Argiustolls	Sarben	Ustic Torriorthents
Hord	Cumulic Haplustolls	Keith	Aridic Argiustolls
Uly	Typic Haplustolls	Duroc	Pachic Haplustolls
Valentine	Typic Ustipsamments	Ulysses	Aridic Haplustolls
Jayem	Aridic Haplustolls	Valent	Ustic Torripsamments

Physical and Chemical Analyses

Information useful to soil scientists in classifying soils and in developing concepts of soil genesis can be obtained from laboratory analyses of the soils. Data thus obtained are helpful in estimating available water capacity, permeability, organic-matter content, fertility, tilth, and other soil characteristics that affect soil management.

Samples of soils from Lincoln County and of similar soils from nearby counties have been collected from time to time for physical and chemical analyses by the Soil Conservation Service, Soil Survey Investigations Unit, in Lincoln, Nebraska. Data resulting from the laboratory analyses of the Anselmo, Cass, Hall, Holdrege, Hord, Silver Creek, and Valentine soils are given in Soil Survey Investigations Report No. 5 (*7*), and data from the analyses of Creighton and Dunday soils are summarized in Soil Survey Investigations Report No. 8 (*8*).

Reaction, electrical conductivity, and percentage of exchangeable sodium are laboratory data that are helpful in evaluating the possibility of reclaiming and managing saline-alkali areas. Many samples of soils from the Platte Valley have been analyzed for salinity and soil reaction. These data are on file at the local office of the Soil Conservation Service at North Platte.

General Nature of the County

This section is mainly for those not familiar with the area. Information is given on the geology, relief, drainage, climate, water supply, natural resources, and trends in agriculture and land use in Lincoln County. There follows a brief description of industry, transportation, and available services.

Geology

Rock ledges in the valley side slopes south and southeast of North Platte and in a few places along Red Willow and Medicine Creeks in southern Lincoln County are outcrops of indurated beds in the Ogallala Formation of Tertiary age. Consisting mostly of calcareous siltstone and calcareous sandstone, this formation underlies the entire county and is the first hard rock encountered when holes are dug or drilled. The upper surface of the Ogallala was shaped by erosion into a complex of hills and valleys, now almost completely buried beneath a mantle of unconsolidated sediments of Quaternary age ranging in thickness from less than a foot to as much as 400 feet or more. Creighton soils formed in the few places where residuum of weathered Ogallala is at the surface or is very thinly mantled by wind-deposited sediments. The principal areas of these soils are on the lower slopes of the upland breaks southwest of North Platte and on the lower slopes of the upland area between the North Platte and South Platte Rivers.

The unconsolidated Quaternary deposits consist of alluvium, loess, and eolian sand.

Alluvium deposited early in Quaternary time partly fills valleys in the Ogallala surface. This old alluvium is exposed in at least two places—on the upland between the North Platte and South Platte Rivers and on the east valley slopes of Birdwood Creek. Dix soils formed where these materials are at the land surface. Much younger alluvium underlies the terraces and bottom lands in the principal present-day

valleys. Thinly mantled in most places by wind-deposited sediments, the alluvium beneath terraces is the principal parent material for Anselmo, Cozad, Hall, and Hord soils. Similarly mantled in many places, the alluvium beneath bottom lands is the parent material for Alda, Bankard, Caruso, Cass, Elsmere, Humbarger, Inavale, Lawet, Lex, Loup, McCook, Platte, Silver Creek, and Wann soils.

Loess is an extensive deposit beneath much of the upland area in the northern and southern parts of Lincoln County. However, it is the surface material in only part of its extent—primarily, much of the southeastern part of the county, an area of about 42 square miles at the southwest corner of the county, and several small areas along the east and north county lines in the northeastern part of the county. Loess is especially thick in southeastern Lincoln County, where streams have incised deep canyons into this material. Three principal episodes of loess deposition are recognized. The earliest, the Loveland Formation, is exposed on the lower part of steep canyon walls and is distinguished by its reddish tinge. No soils formed in this material were named or recognized in the Lincoln County survey. The next younger loess, the Peoria, is much more widely exposed in the upland but in places is thinly mantled by the Bignell loess. These two younger loesses are the parent material for Coly, Fillmore, Holdrege, Scott, and Uly soils.

Eolian sand, probably younger than the Peoria loess, is the most widespread of the upland deposits. It is the surface material throughout most of the area north of the Platte Rivers and throughout much of the western half of the upland south of those rivers. In many places it rests on loess, but in some places it rests on the old alluvium that partly fills valleys in the Ogallala Formation. Locally it may directly overlie buried hills of the Ogallala Formation. Anselmo, Hersh, and Vetal soils formed in loamy eolian sand in valleys and swales within the sandhills area. Dunday and Valentine soils formed in the rolling and hilly areas of eolian sand.

Relief and Drainage

In Lincoln County, four kinds of landscape have resulted from the sculpturing action of wind and water: *sandhills*, *loess hills and plains*, *sand-loess transition areas*, and *alluvial valleys*.

The *sandhills* consist mainly of lines of stabilized rolling hills and dunes that alternate with nearly level valleys. Some areas have a choppy appearance. The crests of the dunes range from 50 to 250 feet above the valley floors. Little surface drainage occurs in the sandhills because precipitation is readily absorbed by the sandy soils. No lakes or marshes occur in the sandhills areas of Lincoln County.

The main area of *loess hills and plains* is in the southeastern part of the county, but small areas are in the northeastern and southwestern parts. These areas are strongly dissected. Relief from the tablelands to the narrow flood plains of streams ranges from 50 to 100 feet. Drainage generally is well established. Some parts of the plains drain into small depressions, which then become intermittent ponds.

Sand-loess transition areas are between the sandhills and the loess hills and plains and are characterized by features of both landscapes. These areas consist of nearly level sandy upland, occasional choppy sand features, nearly level loess upland, and dissected loess hills. Long low ridges formed by wind action are common in the more sandy parts of the transition areas. Where such ridges interrupt drains, they have created depressions in which runoff accumulates in intermittent ponds. Some of the nearly level areas have poorly defined surface drains. For the most part, however, the transition areas are well drained either internally or by surface drains.

Alluvial valleys consist of stream terraces and bottom lands. The more extensive of these are along the North Platte, South Platte, and Platte Rivers. Others are the narrower bottom lands along Red Willow and Medicine Creeks in southwestern and south-central Lincoln County, along Birdwood Creek in the northwestern part of the county, and along numerous smaller streams. The most extensive terrace is on the south side of the South Platte River valley in the vicinity of North Platte and continues southeastward along the south side of the Platte River to and beyond the east county line. This terrace is nearly level to gently sloping, is well drained, and ranges in width from about 1 mile to nearly 3 miles. The bottom lands are mostly well drained or moderately well drained but in places are somewhat poorly to very poorly drained. Marshes and lakes occur in abandoned channels of the Platte Rivers.

The North Platte and South Platte Rivers enter the county from the west and flow eastward. They roughly parallel each other until they join to form the Platte River just east of North Platte. From the point of confluence the Platte flows east-southeasterly across the eastern part of the county. The principal perennial tributaries entering the Platte Rivers from the north are Birdwood, White Horse, and Pawnee Creeks and from the south are Bear and Fremont Sloughs. The flow of these streams consists almost wholly of ground-water seepage because the sandy soils in their drainage areas absorb most of the precipitation. Several intermittent streams enter the Platte River from the south. These streams occupy deep canyons cut into loess uplands in the southeastern part of the county.

The southern part of Lincoln County is drained by south-flowing tributaries of the Republican River. Two of these streams—Red Willow and Medicine Creeks—are perennial and the others are intermittent. A small area at the northeast corner of the county is drained by intermittent streams flowing northward to the South Loup River. Most of the intermittent streams occupy deep canyons in loess uplands.

Climate[8]

The climate of Lincoln County is characterized by frequent and rapid changes in the weather throughout the year. Annual precipitation is intermediate between that of humid and arid regions. Summers are warm and winters are cold, although warming chinook winds blowing off of the east slopes of the Rockies provide mild interludes in the middle of winter.

Monthly and seasonal weather data for North Platte are believed to be representative of local conditions (tables 9 and 10). Daily minimum temperatures, however, can vary from place to place especially on calm clear mornings, and amounts of rain occurring during individual showers can differ greatly within distances of only a mile or two.

In autumn, winter, and early in spring, precipitation generally is well distributed and accumulates at a slow rate. Late in spring and in summer, the main sources of precipita-

[8] By MORRIS S. WEBB, JR., State climatologist for Nebraska, National Weather Service, U.S. Department of Commerce.

TABLE 9.—*Temperature and precipitation data*

[All data are for North Platte, Nebr.]

Month	Temperature				Precipitation				
	Average daily—		Two years in 10 [2] will have at least 4 days with—		Average total	One year in 10 [1] will have—		Days having snow cover of 1 inch or more [3]	Average depth of snow on days having snow cover [3]
	Maximum [1]	Minimum [1]	Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Equal to or less than—	Equal to or more than—		
	°F.	°F.	°F.	°F.	Inches	Inches	Inches		Inches
January	37	10	59	−12	0.5	0.1	1.1	12	3
February	41	15	63	−3	.5	.1	1.3	10	2
March	47	22	70	4	1.0	.2	2.2	7	4
April	62	34	81	21	1.9	.2	3.6	1	3
May	71	45	87	34	3.3	1.2	7.1	(4)	1
June	81	55	100	45	3.9	1.6	6.0	0	----------
July	87	61	98	52	2.9	1.3	5.4	0	----------
August	87	60	99	50	2.1	.3	4.2	0	----------
September	77	48	93	33	2.0	.2	5.6	0	----------
October	67	35	86	21	1.0	.1	2.1	1	2
November	50	22	71	2	.5	.1	1.1	2	2
December	40	14	60	−5	.4	.1	.8	8	2
Year	62	35	[5] 102	[6] −16	20.0	14.4	29.7	41	3

[1] Based on period 1942–71.
[2] Based on period 1948–63.
[3] Based on period 1949–71.
[4] Less than half a day.
[5] Average annual highest temperature. Based on period 1900–71.
[6] Average annual lowest temperature. Based on period 1900–71.

TABLE 10.—*Probabilities of specified temperatures in spring and fall*

[Data for North Platte, Nebr., during period 1921–65. Temperatures measured in a standard National Weather Service thermometer shelter at a height of about 5 feet above ground and in a representative exposure. Lower temperatures will exist at times nearer the ground and in local areas subject to extreme air drainage]

Probability	Date for given probability and temperature				
	16°F. or lower	20°F. or lower	24°F. or lower	28°F. or lower	32°F. or lower
Spring:					
1 year in 10 later than	April 10	April 18	April 28	May 10	May 21
2 years in 10 later than	April 5	April 12	April 22	May 4	May 15
5 years in 10 later than	March 25	April 2	April 12	April 23	May 4
Fall:					
1 year in 10 earlier than	October 21	October 17	October 9	September 27	September 18
2 years in 10 earlier than	October 27	October 22	October 14	October 3	September 23
5 years in 10 earlier than	November 7	November 1	October 24	October 16	October 3

tion are showers and thunderstorms. On the average, hailstorms occur 4 times a year and are locally severe somewhere in the county once each year. Tornadoes occur infrequently.

The annual precipitation averages 20.0 inches. (See table 9.) Normally about 80 percent of this amount falls during the warm part of the year, April through September. In an average year, the precipitation is 0.01 inch or more on 80 days and 0.10 inch or more on 39 days. Heavy precipitation, amounting to 0.50 inch or more, occurs on an average of 13 days per year, 12 of these being during the growing season. Rainfalls that equal or exceed 0.8 inch in 30 minutes, 1.1 inches in 3 hours, and 1.7 inches in 12 hours can be expected to occur about once a year. Rainfalls of 2.3 inches or more in 24 hours can be expected once every 2 years and of 4.3 inches or more once every 25 years.

Annual snowfall averages about 31 inches and accounts for about 15 percent of the yearly precipitation. Snow does not remain on the ground for long periods except during severe winters. Snowfalls accompanied by strong north winds sometimes result in blizzard conditions.

Because precipitation during the growing season commonly is neither sufficient nor timely, irrigation generally is needed to supply the supplemental water necessary for some crops. The optimum rainfall for growing corn is 1 inch or more a week. The chances of receiving this amount are 2 in 5 in June, but only 1 in 5 in late July and August.

Recorded temperature extremes at North Platte, since records were begun in 1874, range from −35°F. on January 15, 1888, and February 12, 1899, to 112°F. on July 11, 1954. The temperature falls to 32°F. or lower an average of 180 days a year and rises to 90°F. or higher (too high for optimum corn growth) an average of 29 days a year. Since high temperatures frequently are accompanied by low relative humidities, undue heat stress to livestock is unlikely. The number of days between the last reading of 32 degrees in the spring and the first reading of 32 degrees in the fall is 152 days. The probabilities of specified temperatures in spring and fall are shown in table 10.

Annual free-water evaporation from small lakes and farm ponds averages 47 inches. About 75 percent of the total annual evaporation occurs between May 1 and October 31.

Water Supply

Water is an important natural resource in Lincoln County. Wells supply all of the water for rural and urban domestic needs and some of the water for irrigation, industry, and livestock. Farm ponds and streams supply water for irrigation and livestock. Reservoirs and ponds supply water for irrigation, power, and industry.

In the Platte Valley, the depth to water is less than 20 feet below the surface and few wells are more than 50 feet deep. Wells in the uplands are 100 to 200 feet deep. In most places in the county, changes in water level are mostly small and wholly due to natural recharge and discharge. Locally, however, water-level changes of larger magnitude are caused by one or more of the following: seepage from drainage ditches, canals, and reservoirs; pumping for domestic livestock, irrigation, and industrial uses; and straightening of stream channels. Precipitation is the source of most recharge. Seepage into stream channels, loss to the atmosphere through direct evaporation and transpiration of plants whose roots extend to the water table, and pumping from wells account for ground-water discharge.

The supply of ground water in the county is adequate for present domestic, agricultural, industrial, and urban uses. Even though demands are increasing, supplies in the Platte Valley should remain adequate because natural loss of water to the atmosphere is diminished by an amount approximately equal to pumpage from wells. Sutherland Reservoir, Maloney Lake, and Jeffrey Reservoir store water for generation of hydroelectric power and for irrigation. They also provide sites for recreation. Seepage from these bodies of water and their associated canals contributes to ground-water recharge in the vicinity of these structures.

Water throughout the county is of good quality. Water in the sandhills area north of the Platte River has the lowest mineral content, and that in the Platte Valley has the highest, 400 to 700 milligrams of dissolved solids per liter.

Natural Resources

In addition to water, the principal natural resource of Lincoln County is its soils. These are used for the production of large amounts of feed grains, forage crops, and cash-grain crops. In the Platte Valley, bottom lands now being used for the production of prairie hay have potential as irrigated cropland.

Sand and gravel from pits in the Platte Valley provide abundant coarse material for use in road building and as aggregate in concrete. Silica from a mine in the extreme northeastern part of the county is used as an abrasive in soap products.

Trends in Agriculture and Land Use

Ranching and farming have been the most important enterprises in Lincoln County since the county was settled, although the trend is towards fewer and larger ranches and farms. According to Nebraska Agricultural Statistics, the number of ranches and farms in the county decreased from 1,380 in 1962 to 1,235 in 1967 to 1,180 in 1972. Ranches, where farming operations generally are limited to haying, range from 3,200 to 23,000 acres in size. Most farmers combine dryland and irrigation farming with some ranching or cattle operations. Farms used mostly for dryfarming range from 480 to 1,280 acres in size, and those used mostly for irrigation farming range from 320 to 800 acres. Many farmers in the North Platte area supplement their income by off-the-farm employment.

Livestock provides the largest source of income for ranchers and farmers in the county. Cow-calf herds are becoming larger and, according to Nebraska Agricultural Statistics, the number of cattle increased from 144,530 in 1962 to 159,300 in 1972. Although the number of dairy cows decreased significantly, the production of milk increased by more than 10 percent. Hogs on farms increased in number from 21,250 in 1962 to 36,000 in 1972. In this period, the number of sheep and chickens decreased by 21 and 68 percent respectively.

Increasing the number of cattle has resulted in greater emphasis on crop production for feeding and marketing. This, in turn, has caused an increased use of commercial fertilizer and greater use of water for irrigation. According to records of the Nebraska Department of Water Resources, water from 517 irrigation wells irrigated a total of 70,153 acres in 1962. By June 1973, water from 804 wells was being used to irrigate 127,678 acres. An additional 30,000 acres were irrigated by water provided by the eight irrigation districts in the county.

Corn is the most important crop. From 1962 to 1972, the acreage of irrigated corn increased from 32,320 to 44,400 and the acreage of dryland corn decreased from 25,610 to 19,000. During this period, the acreage of winter wheat increased from 43,460 to 46,000, the acreage of rye for grain decreased from more than 10,000 to less than 1,000, and the acreage of grain sorghum decreased more than 60 percent. Oats, barley, soybeans, sugar beets, Irish potatoes, and field beans are grown in small amounts. From 1962 to 1972, the acreage of soybeans increased, acreages of sugar beets, oats, and barley decreased, and acreages of potatoes and field beans remained relatively unchanged. During this period, the acreage of irrigated alfalfa increased and the acreages of dryland alfalfa and harvested wild hay decreased.

Industries, Transportation, and Services

Many of the businesses and industries in Lincoln County are related to agriculture. Meat packing plants, grain

elevators, alfalfa mills, and fertilizer distribution plants are agriculture-related enterprises. Business services to agriculture include a livestock sale barn, farm machinery dealers, automotive dealers, and trucking firms. Other businesses include plants that manufacture dog food and concrete products. North Platte provides the largest market for grain and livestock and is the largest shopping center in the county. Markets and shopping centers are also provided by Sutherland and Hershey in the South Platte River valley, by Hershey, Maxwell and Brady in the Platte River valley, and by Wellfleet and Wallace in the southern part of the county.

The Union Pacific Railroad in North Platte serves the area in Platte Valley. Trains made up here provide freight service from Platte Valley to points east and west. The Burlington Northern Railroad serves the southern part of the county. Passenger service from North Platte is available by bus along two routes and by two daily air flights. Chartered flights are available at the Lee Bird Municipal Airport near North Platte.

U.S. Highway 30 and Interstate 80 cross the county in an east-west direction and U.S. Highway 83 crosses in a north-south direction. All pass through North Platte. State Highways 23, 25, 70, and 97 provide good roads for farm, industrial, and service vehicles. Graveled county and township roads are used by rural mail carriers, school buses, farm vehicles, and family cars.

Every town in Lincoln County has public elementary schools, and 16 rural schools serve 20 districts. North Platte has two public junior high schools and one public senior high school. It also has Catholic, Lutheran, and Seventh-Day Adventist elementary schools; a Catholic high school; a Junior College; and the Mid-Plains Vocational Technical College. Sutherland, Hershey, Maxwell, and Wallace have public high schools.

Churches of various faiths are in North Platte and scattered throughout the county. Three radio stations and a television station serve the area. A daily newspaper published in North Platte has a wide circulation in west-central Nebraska. Utilities are provided throughout the county by electric, and telephone companies. Natural gas is available in the larger towns but not in remote rural areas.

Recreational facilities are available at Maloney Lake, at Jeffrey and Sutherland Reservoirs, and in special use areas at Wellfleet, Hanson Memorial Reserve, Boxelder Canyon, and Cottonwood Canyon.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Buried soil. A developed soil, once exposed but now overlain by another soil more recently formed.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Calcic horizon. A subsurface horizon more than 6 inches thick that has more than 15 percent calcium carbonate equivalent and at least 5 percent more carbonates than the C horizon.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concave slope. A slope that is rounded inward, as the inside of a bowl.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conifer (botany). Any tree of the pine family bearing true cones and any of the yew family having a berrylike fruit. The wood of conifers is commercially known as "softwood."

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Convex slope. A slope that is rounded outward, as the outside of a bowl.

Deciduous. Refers to plants that lose their leaves at maturity, or at certain seasons. Contrasts with evergreen.

Depth, soil. Total thickness of weathered soil material over bedrock or mixed sand and gravel. In this report, the classes of soil depth are as follows:

	Inches
Very shallow	0 to 10
Shallow	10 to 20
Moderately deep	20 to 40
Deep	40 or more

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Dryfarming. Production of crops that require some tillage in a subhumid or semiarid region, without irrigation. Usually involves use of periods of fallow, during which time enough moisture accumulates in the soil to allow production of a cultivated crop.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Evergreen (botany). A plant or tree that remains verdant, such as conifer trees and many tropical plants. Evergreen is often used loosely as a synonym for conifer but some conifers, such as the larch, are deciduous, and many true evergreens, such as the laurel, are not conifers. Contrasts with deciduous.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated

bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Immature soil. A soil lacking clearly defined horizons because the soil-forming forces have acted on the parent material only a relatively short time since it was deposited or exposed.

Intake rate. The average rate that water enters the soil, under irrigation. Most soils have a faster initial rate which decreases with application time. Therefore, intake rate for design purposes is not a constant, but is a variable depending upon the net irrigation application.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Landscape. All the characteristics that distinguish a certain kind of area on the earth's surface and give it a distinguishing pattern, in contrast to other kinds of areas. Any one kind of soil is said to have a characteristic natural landscape, and under different uses it has one or more characteristic cultural landscapes.

Leached soil. A soil from which most of the soluble material has been removed from the entire profile or has been removed from one part of the profile and has accumulated in another part.

Leaching. The removal of soluble material from soil or other material by percolating water.

Legume. A member of the legume, or pulse, family (Leguminosae). One of the most important and widely distributed plant families. Includes many valuable forage species, such as peas, beans, peanuts, alfalfa, sweet clover, lespedeza, vetch, and kudzu. Practically all legumes are nitrogen-fixing plants, and many of the herbaceous species are used as cover and green-manure crops. Even some of the legumes that have no forage value (crotalaria and some lupines) are used for soil improvement. Other legumes are locust, honeylocust, redbud, mimosa, wisteria, and many tropical plants.

Light textured soil. Sand and loamy sand.

Lime. Chemically, lime is calcium oxide (CaO), but its meaning has been extended to include all limestone-derived materials applied to neutralize acid soils. Agricultural lime can be obtained as ground limestone, hydrated lime, or burned lime, with or without magnesium minerals. Basic slag, oystershells, and marl also contain calcium.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Mature soil. Any soil with well-developed soil horizons having characteristics produced by the natural processes of soil formation and in near equilibrium with its present environment.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Mulch. A natural or artificially applied layer of plant residue or other material on the surface of the soil. Mulches are generally used to help conserve moisture, control temperature, prevent surface compaction or crusting, reduce runoff and erosion, improve soil structure, or control weeds. Common mulching materials are wood chips, plant residue, sawdust, and compost.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Organic matter. A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition. In this report, the organic-matter content is rated according to the percentage of organic material in the upper 10 inches of soil after the mixed soil and organic material are put through a 2-mm sieve. The ratings are as follows:

	Percent
Very low	Less than 0.5
Low	0.5–1.0
Moderately low	1.0–2.0
Moderate	2.0–4.0
High	More than 4.0

Parent material. The disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plow layer. The soil ordinarily moved in tillage; equivalent to surface soil.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Puddled soil. A soil that is dense, massive, and without regular structure because it has been artificially compacted when wet. Commonly, a puddled soil is a clayey soil that has been tilled when wet.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from

0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy soils. A broad term for soils of the sand and loamy sand classes: soil material with more than 70 percent sand and less than 15 percent clay.

Seasonal high water table. The distance from the surface of the soil to the highest level that ground water reaches in the soil in most years. It does not refer to the lowest level reached in late summer.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickspot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. Deviation from the horizontal, expressed as a percentage. In this survey the following slope classes are recognized:

Simple slopes	*Percent*	*Complex slopes*	*Percent*
Nearly level	0 to 1	Nearly level	0 to 1
Very gently sloping	1 to 3	Gently undulating	1 to 3
Gently sloping	3 to 7	Undulating	3 to 7
Moderately sloping	7 to 9	Rolling	7 to 9
Moderately steep	9 to 15	Hilly	9 to 15
Steep	15 to 30	Steep	15 to 30
Very steep	More than 30	Very steep	More than 30

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stream terrace. (See terrace, geology).

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subgrade (engineering). The substratum, consisting of in-place material or fill material, that is prepared for highway construction; does not include stabilized base course of actual paving material.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. In this survey, the A horizon.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Transition layer. A layer somewhat resembling two different horizons of a soil and genetically related to them. In this survey, the AC horizon.

Underlying material. Generally, weathered soil material immediately beneath the solum. In this survey, the C horizon of a soil.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windbreak. Any shelter that protects from the wind. A vegetative windbreak is a strip of closely spaced trees or shrubs that is planted primarily to deflect wind currents and thereby reduce soil blowing, control snow drifting, conserve moisture, and protect crops, livestock, and buildings.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Information about the use and management of each soil is given in the description of the capability unit, range site, and windbreak suitability group to which it is assigned.

Map symbol	Mapping unit	Page	Capability unit: Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site	Windbreak suitability group
Ad	Alda soils	14	IIIw-4	53	IIIw-7	62	Subirrigated	2
AfB	Anselmo sandy loam, terrace, 0 to 3 percent slopes	15	IIe-3	51	IIe-8	60	Sandy	3
AfC	Anselmo sandy loam, terrace, 3 to 5 percent slopes	15	IIIe-3	52	IIIe-8	61	Sandy	3
AnB	Anselmo fine sandy loam, 0 to 3 percent slopes	15	IIe-3	51	IIe-8	60	Sandy	3
AnC	Anselmo fine sandy loam, 3 to 5 percent slopes	15	IIIe-3	52	IIIe-8	61	Sandy	3
AnD	Anselmo fine sandy loam, 5 to 9 percent slopes	15	IVe-3	54	IVe-8	64	Sandy	3
Bk	Bankard loamy fine sand, loamy subsoil variant	16	IVe-5	54	IVe-11	65	Sandy Lowland	3
Bo	Blown-out land	16	VIIe-5	57	------	--	Sands	10
Cb	Caruso loam	17	IIc-1	52	I-4	59	Silty Lowland	1
CeB	Cass fine sandy loam, 0 to 3 percent slopes	18	IIe-3	51	IIe-8	60	Sandy Lowland	3
Cf	Cass fine sandy loam, calcareous variant	19	IIe-3	51	IIe-8	60	Sandy Lowland	3
CoD	Coly silt loam, 7 to 9 percent slopes	19	IVe-9	54	IVe-6	64	Limy Upland	5
CoE	Coly silt loam, 9 to 15 percent slopes	19	VIe-9	57	------	--	Limy Upland	5
CoF	Coly silt loam, 15 to 30 percent slopes	19	VIe-9	57	------	--	Limy Upland	10
CsA	Cozad silt loam, 0 to 1 percent slopes	20	IIc-1	52	I-6	59	Silty Lowland	1
CsB	Cozad silt loam, 1 to 3 percent slopes	20	IIe-1	51	IIe-6	59	Silty	4
CsC	Cozad silt loam, 3 to 7 percent slopes	20	IIIe-1	52	IIIe-6	61	Silty	4
Ct	Cozad silt loam, saline-alkali	20	IVs-1	55	IIIs-6	63	-------------------	8
	Strongly and very strongly alkaline part	--	------	--	------	--	Saline Subirrigated	--
	Moderately alkaline part	--	------	--	------	--	Subirrigated	--
Cu	Cozad silt loam, wet	21	IIw-4	51	IIw-6	60	Subirrigated	2
Cv	Cozad silty clay loam	21	IIc-1	51	I-3	58	Silty Lowland	1
Cx	Cozad loam, sandy subsoil variant	21	IIc-1	51	I-6	59	Silty	1
CzE	Creighton complex, 7 to 20 percent slopes	22	VIe-1	56	------	--	Silty	4
DbF	Dix complex, 5 to 30 percent slopes	22	VIs-4	57	------	--	Shallow to Gravel	10
DuB	Dunday loamy fine sand, 0 to 3 percent slopes	23	IVe-5	54	IIIe-11	61	Sandy	3
DvC	Dunday-Valentine loamy fine sands, 0 to 5 percent slopes	24	IVe-5	54	IVe-11	65	Sandy	3
EaB	Elsmere loamy fine sand, 0 to 3 percent slopes	24	IVw-5	55	IVw-11	65	Subirrigated	2
ExC	Elsmere complex, 0 to 5 percent slopes	24	IVw-5	55	IVw-11	65	Subirrigated	2
Fm	Fillmore complex	25	IIIw-2	53	IIIw-2	62	Clayey Overflow	6
Ga	Gravelly alluvial land	25	VIIs-3	58	------	--	Subirrigated	10
HaA	Hall silt loam, 0 to 1 percent slopes	26	IIc-1	52	I-4	59	Silty Lowland	4

Map symbol	Mapping unit	Page	Capability unit Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site	Windbreak suitability group
HaB	Hall silt loam, 1 to 3 percent slopes	26	IIe-1	51	IIe-4	59	Silty	4
Hb	Hall silt loam, terrace	26	IIc-1	52	I-4	59	Silty Lowland	4
HcB	Hersh-Anselmo fine sandy loams, 1 to 3 percent slopes	27	IIIe-3	52	IIIe-8	61	Sandy	3
HdC	Hersh-Valentine loamy fine sands, 0 to 5 percent slopes	27	IVe-5	54	IVe-10	65	Sandy	3
HeC	Hersh soils, 3 to 5 percent slopes	27	IIIe-3	52	IIIe-8	61	Sandy	3
HeD	Hersh soils, 5 to 9 percent slopes	27	IVe-3	54	IVe-8	64	Sandy	3
HfF	Hersh and Anselmo soils, 9 to 30 percent slopes	28	VIe-3	56	------	--	Sandy	3
HgD	Hersh and Valentine soils, 5 to 9 percent slopes	28	VIe-5	57	------	--	Sandy	7
HhB	Hobbs fine sandy loam, 0 to 3 percent slopes	28	IIe-3	51	IIe-5	59	Sandy	3
HhC	Hobbs fine sandy loam, 3 to 7 percent slopes	29	IIIe-3	52	IIIe-5	61	Sandy	3
HkA	Hobbs silt loam, 0 to 1 percent slopes	29	IIc-1	52	I-6	59	Silty Lowland	1
HkB	Hobbs silt loam, 1 to 3 percent slopes	29	IIe-1	51	IIe-6	59	Silty Lowland	1
HkC	Hobbs silt loam, 3 to 7 percent slopes	29	IIIe-1	52	IIIe-6	61	Silty	4
Hm	Hobbs and McCook silt loams	29	IIw-3	51	IIw-6	60	Silty Overflow	1
HnB	Holdrege fine sandy loam, 0 to 3 percent slopes	30	IIe-3	51	IIe-5	59	Sandy	3
HoB	Holdrege silt loam, 1 to 3 percent slopes	30	IIe-1	51	IIe-4	59	Silty	4
HoC	Holdrege silt loam, 3 to 7 percent slopes	30	IIIe-1	52	IIIe-4	60	Silty	4
HoC2	Holdrege silt loam, 3 to 7 percent slopes, eroded	31	IIIe-1	52	IIIe-4	60	Silty	4
HpC	Holdrege complex, 3 to 7 percent slopes	31	IIIe-3	52	IIIe-5	61	Sandy	3
HrD	Holdrege and Uly silt loams, 7 to 9 percent slopes	31	IVe-1	53	IVe-4	64	Silty	4
HsB	Hord fine sandy loam, 0 to 3 percent slopes	32	IIe-3	51	IIe-5	59	Sandy	3
HtA	Hord silt loam, 0 to 1 percent slopes	32	IIc-1	52	I-6	59	Silty	4
HtB	Hord silt loam, 1 to 3 percent slopes	32	IIe-1	51	IIe-6	59	Silty	4
HxA	Hord silt loam, terrace, 0 to 1 percent slopes	33	IIc-1	52	I-6	59	Silty Lowland	4
HxB	Hord silt loam, terrace, 1 to 3 percent slopes	33	IIe-1	51	IIe-6	59	Silty Lowland	4
Hz	Humbarger loam, gravelly substratum	33	I-1	50	I-4	59	Silty Lowland	1
In	Inavale loamy fine sand	34	VIe-5	57	IVe-11	65	Sandy Lowland	3
La	Lawet fine sandy loam, drained	35	IIIw-6	53	IIIw-5	62	Subirrigated	2
Lb	Lawet silt loam	35	IVw-4	55	------	--	Subirrigated	6
Lc	Lawet silt loam, drained	35	IIIw-4	53	IIIw-6	62	Subirrigated	2
Ld	Lawet silt loam, saline-alkali	36	IVs-1	55	IIIs-4	63	----------------	8
	Strongly and very strongly alkaline part	--	------	--	------	--	Saline Subirrigated	--
	Moderately alkaline part	--	------	--	------	--	Subirrigated	--
Le	Lawet-Slickspot complex	36	IVs-1	55	IVs-4	66	Saline Subirrigated	8
Lf	Lawet loam, gravelly subsoil variant	36	IVw-4	55	------	--	Subirrigated	6

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site	Windbreak suitability group
Lg	Lex loam	37	IIIw-4	53	IIIw-7	62	Subirrigated	2
Lh	Lex loam, saline-alkali	37	IVs-1	55	IIIs-7	63	------------------	8
	Strongly and very strongly alkaline part	--	------	--	------	--	Saline Subirrigated	--
	Moderately alkaline part	--	------	--	------	--	Subirrigated	--
Lo	Loup complex	38	Vw-7	55	------	--	Wet Land	6
Ma	Marsh	38	VIIIw-7	58	------	--	------------------	10
Mb	McCook loam	39	I-1	50	I-6	59	Silty Lowland	1
Mc	McCook loam, saline-alkali	39	IVs-1	55	IIIs-6	63	------------------	8
	Moderately to strongly alkaline part	--	------	--	------	--	Saline Lowland	--
	Mildly alkaline part	--	------	--	------	--	Silty Lowland	--
Mu	Muck	39	Vw-7	55	------	--	Wet Land	6
Pa	Platte-Alda complex	40	VIw-4	57	IVw-13	65	Subirrigated	2
Ra	Riverwash	40	VIIIs-7	58	------	--	------------------	10
Rb	Rough broken land, loess	40	VIIe-7	58	------	--	Thin Loess	10
Sc	Scott soils	42	IVw-2	54	------	--	------------------	10
Se	Silver Creek silt loam	42	IIIw-2	53	IIIw-2	62	Subirrigated	2
Su	Silver Creek silt loam, saline-alkali	43	IVs-1	55	IVs-2	66	------------------	8
	Strongly and very strongly alkaline part	--	------	--	------	--	Saline Subirrigated	--
	Moderately alkaline part	--	------	--	------	--	Subirrigated	--
UaC2	Uly silt loam, 3 to 7 percent slopes, eroded	43	IIIe-1	52	IIIe-6	61	Silty	4
UaD	Uly silt loam, 7 to 9 percent slopes	44	IVe-1	53	IVe-6	64	Silty	4
UcD	Uly-Coly silt loams, 7 to 9 percent slopes	44	IVe-1	53	IVe-6	64	------------------	--
	Uly soil	--	------	--	------	--	Silty	4
	Coly soil	--	------	--	------	--	Limy Upland	5
UeE	Uly and Coly silt loams, 9 to 20 percent slopes	44	VIe-1	56	------	--	------------------	--
	Uly soil	--	------	--	------	--	Silty	4
	Coly soil	--	------	--	------	--	Limy Upland	10
VaE	Valentine fine sand, rolling	45	VIe-5	57	------	--	Sands	7
VbB	Valentine loamy fine sand, nearly level	45	IVe-5	54	IVe-11	65	Sandy	3
VbE	Valentine loamy fine sand, rolling	45	VIe-5	57	------	--	Sands	7
VcF	Valentine complex, hilly	46	VIIe-5	57	------	--	------------------	10
	Rolling part	--	------	--	------	--	Sands	--
	Hilly part	--	------	--	------	--	Choppy Sands	--
VeB	Vetal fine sandy loam, loamy substratum, 0 to 3 percent slopes	46	IIe-3	51	IIe-8	60	Sandy	3
Wb	Wann fine sandy loam	47	IIw-6	52	IIw-8	60	Subirrigated	2
Wf	Wann fine sandy loam, saline-alkali	47	IVs-1	55	IIIs-8	64	------------------	8
	Strongly and very strongly alkaline part	--	------	--	------	--	Saline Subirrigated	--
	Moderately alkaline part	--	------	--	------	--	Subirrigated	--
Wm	Wann loam	47	IIw-4	51	IIw-8	60	Subirrigated	2
Wx	Wet alluvial land	47	Vw-7	55	------	--	Wet Land	10

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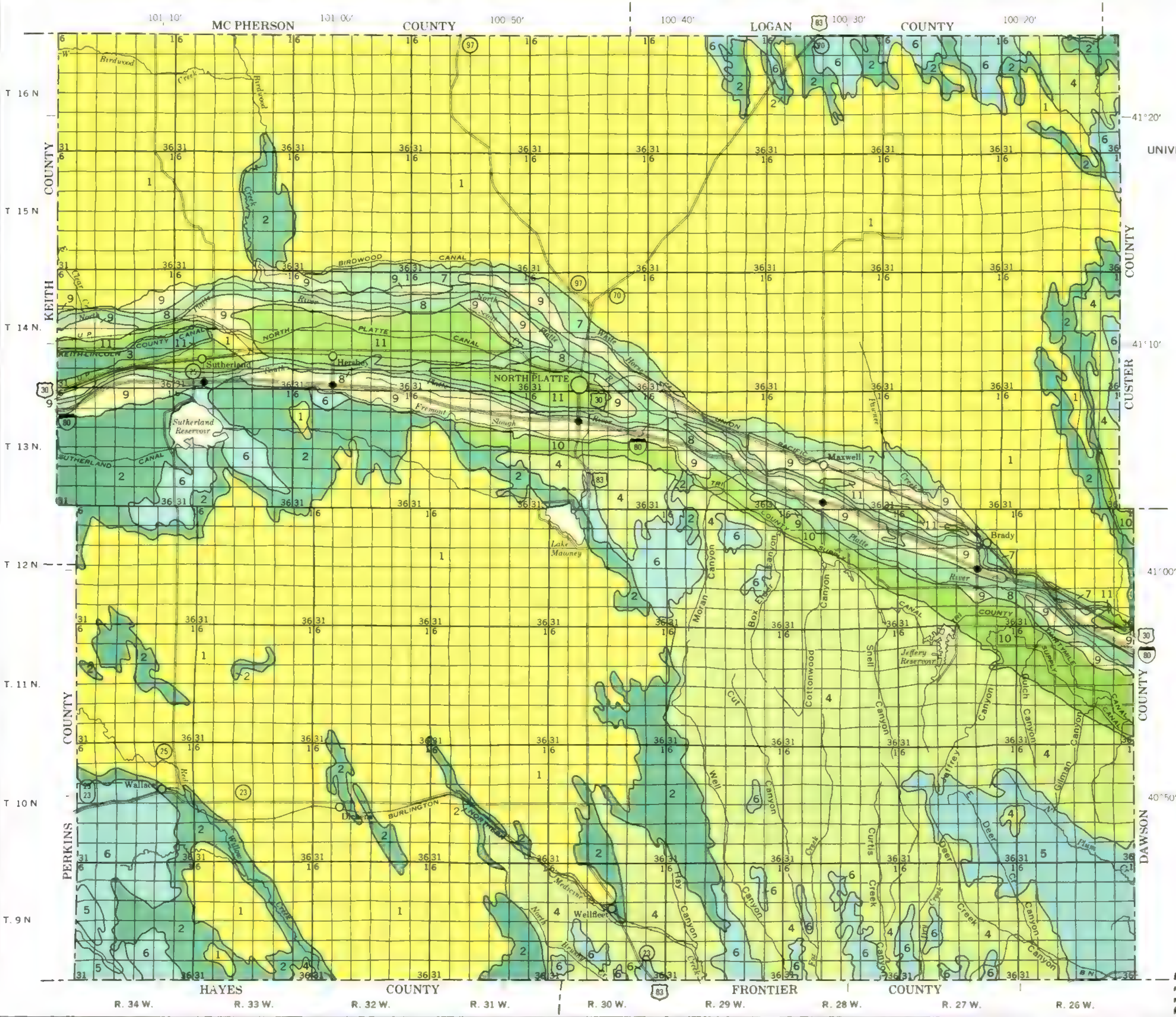


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF NEBRASKA, CONSERVATION AND SURVEY DIVISION

GENERAL SOIL MAP
LINCOLN COUNTY, NEBRASKA

Scale 1:316,800
1 0 1 2 3 4 5 Miles

SOIL ASSOCIATIONS*

SANDY SOILS ON UPLANDS

1 Valentine association: Deep, nearly level to very steep, excessively drained, sandy soils on uplands

LOAMY AND SANDY SOILS ON UPLANDS

2 Hersh-Valentine-Anselmo association: Deep, nearly level to steep, well-drained and excessively drained, loamy and sandy soils on uplands

3 Dix-Hersh-Creighton association: Deep and shallow over mixed sand and gravel, gently sloping to steep, well-drained and excessively drained, sandy and loamy soils on uplands

SILTY SOILS ON DISSECTED UPLANDS

4 Coly-Rough broken land, loess association: Deep, moderately sloping to very steep, well-drained and excessively drained, silty soils on narrow divides and deep drainageways of loess uplands

SILTY SOILS ON SMOOTH UPLANDS

5 Uly-Holdrege-Coly association: Deep, gently sloping to steep, well-drained, silty soils on broad divides and drainageways of loess uplands

6 Holdrege-Hord-Uly association: Deep, nearly level to moderately sloping well-drained, silty soils on tableland broad ridges of loess uplands

SOMEWHAT POORLY DRAINED TO VERY POORLY DRAINED SOILS ON BOTTOM LANDS

7 Lawet-Elsmere-Wet alluvial land association: Deep, nearly level and gently sloping, somewhat poorly drained to very poorly drained, silty and sandy soils on bottom lands

8 Gravelly alluvial land-Platte-Riverwash association: Shallow and very shallow over mixed sand and gravel, nearly level and very gently sloping, somewhat poorly drained to very poorly drained, sandy and loamy soils on bottom lands

SOMEWHAT POORLY DRAINED SOILS ON BOTTOM LANDS

9 Lawet-Wann-Lex association: Deep and moderately deep over mixed sand and gravel, nearly level, somewhat poorly drained, silty and loamy soils on bottom lands

WELL-DRAINED TO SOMEWHAT POORLY DRAINED SOILS ON STREAM TERRACES, FOOT SLOPES, AND HIGH BOTTOM LANDS

10 Cozad-Hord association: Deep, nearly level to gently sloping, well-drained, silty soils on stream terraces and foot slopes

11 Caruso-Silver Creek-Humbarger association: Deep, nearly level, well-drained to somewhat poorly drained, loamy and silty soils on high bottom lands

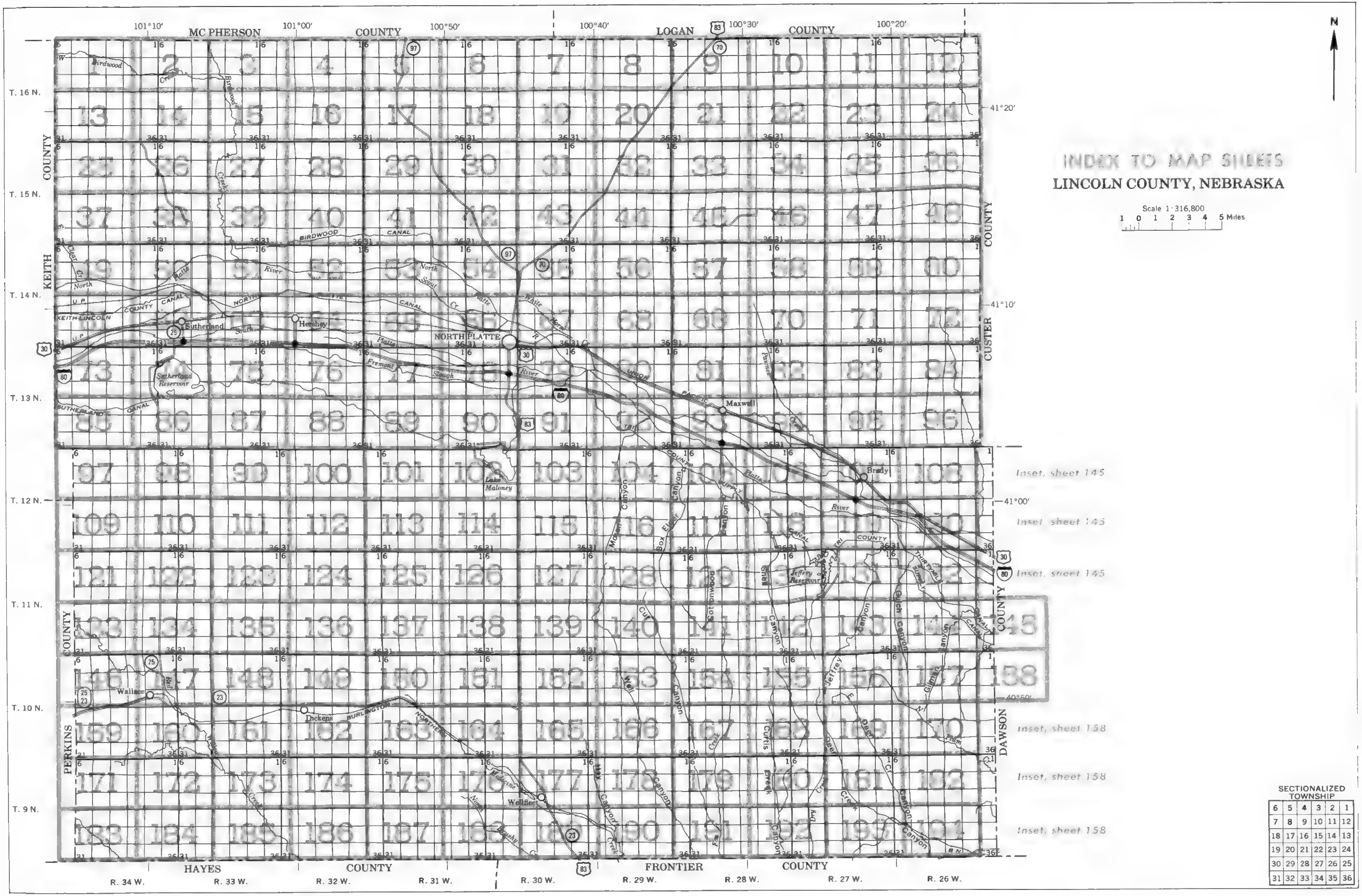
*Texture as given in the soil associations refers to texture of the surface layer of the major soils.

Compiled 1976

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Each soil symbol consists of 2 or 3 letters; for example, Ad, HaB or VaD. If slope is given in the soil name, the third letter, A, B, C, D, E, or F indicates the class of slope. A final number 2 in the symbol indicates that the soil is eroded; for example, HoC2 or UaC2

SYMBOL	NAME
Ad	Alda soils
AfB	Anselmo sandy loam, terrace, 0 to 3 percent slopes
AfC	Anselmo sandy loam, terrace, 3 to 5 percent slopes
AnB	Anselmo fine sandy loam, 0 to 3 percent slopes
AnC	Anselmo fine sandy loam, 3 to 5 percent slopes
AnD	Anselmo fine sandy loam, 5 to 9 percent slopes
Bk	Bankard loamy fine sand, loamy subsoil variant
Bo	Blown-out land
Cb	Caruso loam
CeB	Cass fine sandy loam, 0 to 3 percent slopes
Cf	Cass fine sandy loam, calcareous variant
CoD	Coly silt loam, 7 to 9 percent slopes
CoE	Coly silt loam, 9 to 15 percent slopes
CoF	Coly silt loam, 15 to 30 percent slopes
CsA	Cozad silt loam, 0 to 1 percent slopes
CsB	Cozad silt loam, 1 to 3 percent slopes
CsC	Cozad silt loam, 3 to 7 percent slopes
Ct	Cozad silt loam, saline-alkali
Cu	Cozad silt loam, wet
Cv	Cozad silty clay loam
Cx	Cozad loam, sandy subsoil variant
CzE	Creighton complex, 7 to 20 percent slopes
DbF	Dix complex, 5 to 30 percent slopes
DuB	Dunday loamy fine sand, 0 to 3 percent slopes
DvC	Dunday-Valentine loamy fine sands, 0 to 5 percent slopes
EaB	Elsmere loamy fine sand, 0 to 3 percent slopes
ExC	Elsmere complex, 0 to 5 percent slopes
Fm	Fillmore complex
Ga	Gravelly alluvial land

SYMBOL	NAME
HaA	Hall silt loam, 0 to 1 percent slopes
HaB	Hall silt loam, 1 to 3 percent slopes
Hb	Hall silt loam, terrace
HcB	Hersh-Anselmo fine sandy loams, 1 to 3 percent slopes
HdC	Hersh-Valentine loamy fine sands, 0 to 5 percent slopes
HeC	Hersh soils, 3 to 5 percent slopes
HeD	Hersh soils, 5 to 9 percent slopes
HfF	Hersh and Anselmo soils, 9 to 30 percent slopes
HgD	Hersh and valentine soils, 5 to 9 percent slopes
HhB	Hobbs fine sandy loam, 0 to 3 percent slopes
HhC	Hobbs fine sandy loam, 3 to 7 percent slopes
HkA	Hobbs silt loam, 0 to 1 percent slopes
HkB	Hobbs silt loam, 1 to 3 percent slopes
HkC	Hobbs silt loam, 3 to 7 percent slopes
Hm	Hobbs and McCook silt loams
HnB	Holdrege fine sandy loam, 0 to 3 percent slopes
HoB	Holdrege silt loam, 1 to 3 percent slopes
HoC	Holdrege silt loam, 3 to 7 percent slopes
HoC2	Holdrege silt loam, 3 to 7 percent slopes, eroded
HpC	Holdrege complex, 3 to 7 percent slopes
HrD	Holdrege and Uly silt loams, 7 to 9 percent slopes
HsB	Hord fine sandy loam, 0 to 3 percent slopes
HtA	Hord silt loam, 0 to 1 percent slopes
HtB	Hord silt loam, 1 to 3 percent slopes
HxA	Hord silt loam, terrace, 0 to 1 percent slopes
HxB	Hord silt loam, terrace, 1 to 3 percent slopes
Hz	Humbarger loam, gravelly substratum
In	Inavale loamy fine sand
La	Lawet fine sandy loam, drained
Lb	Lawet silt loam
Lc	Lawet silt loam, drained
Ld	Lawet silt loam, saline-alkali
Le	Lawet-Slickspot complex

SYMBOL	NAME
Lf	Lawet loam, gravelly subsoil variant
Lg	Lex loam
Lh	Lex loam, saline-alkali
Lo	Loup complex
Ma	Marsh
Mb	McCook loam
Mc	McCook loam, saline-alkali
Mu	Muck
Pa	Platte-Alda complex
Ra	Riverwash
Rb	Rough broken land, loess
Sc	Scott soils
Se	Silver Creek silt loam
Su	Silver Creek silt loam, saline-alkali
UaC2	Uly silt loam, 3 to 7 percent slopes, eroded
UaD	Uly silt loam, 7 to 9 percent slopes
UcD	Uly-Coly silt loams, 7 to 9 percent slopes
UeE	Uly and Coly silt loams, 9 to 20 percent slopes
VaE	Valentine fine sand, rolling
VbB	Valentine loamy fine sand, nearly level
VbE	Valentine loamy fine sand, rolling
VcF	Valentine complex, hilly
VeB	Vetal fine sandy loam, loamy substratum, 0 to 3 percent slopes
Wb	Wann fine sandy loam
Wf	Wann fine sandy loam, saline-alkali
Wm	Wann loam
Wx	Wet alluvial land

LINCOLN COUNTY, NEBRASKA

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

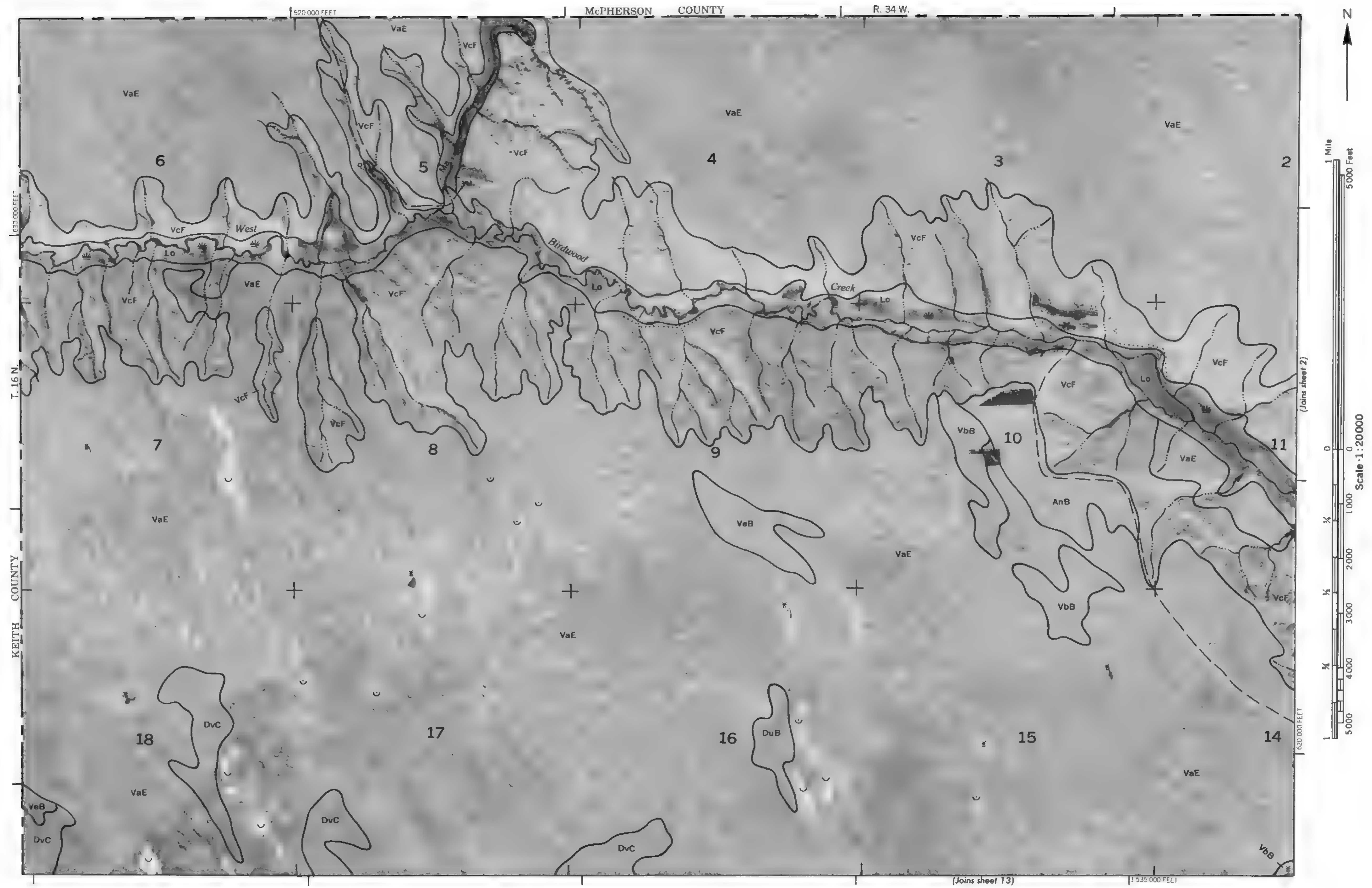
GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

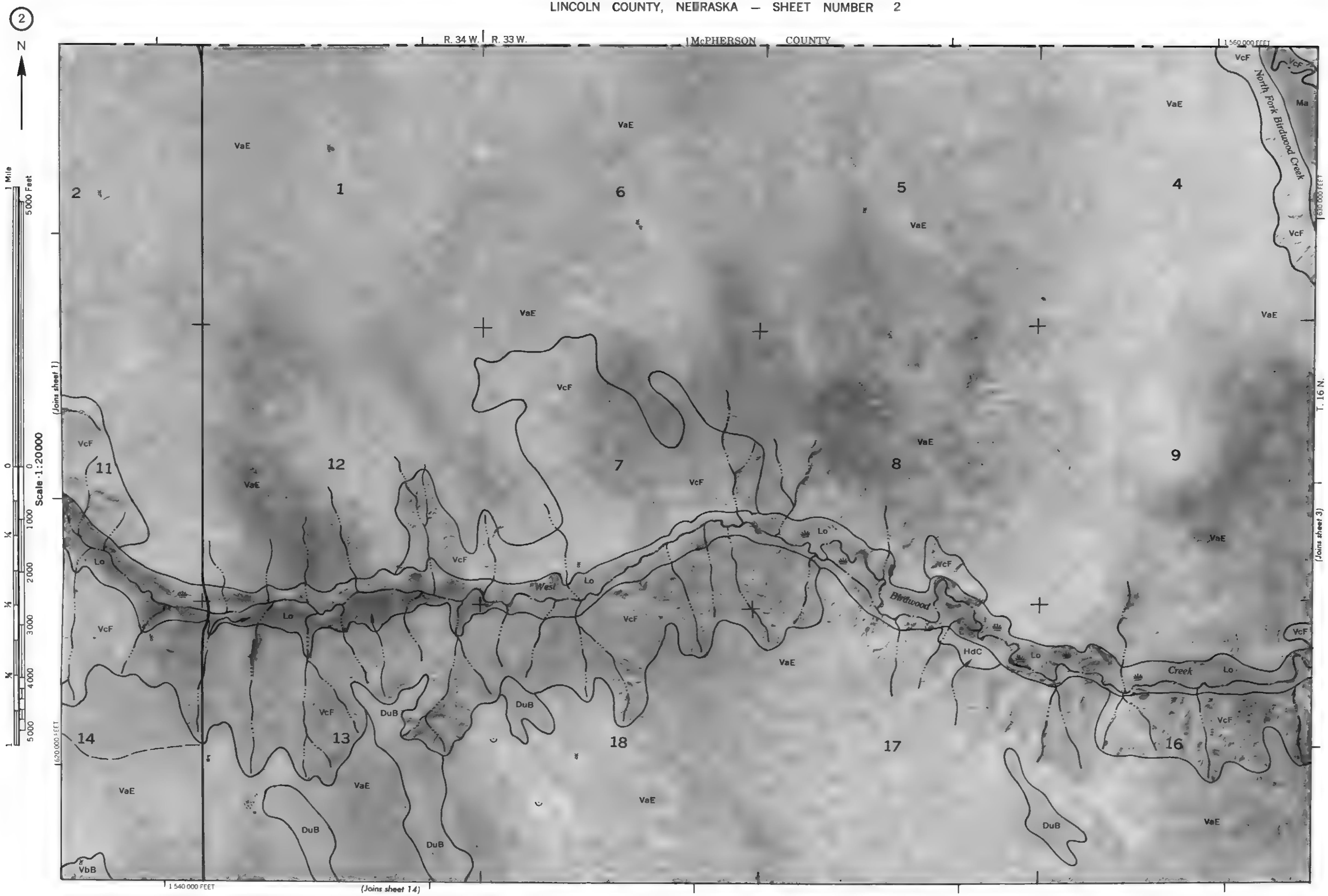
MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Silty outcrop area, ½ to 5 acres



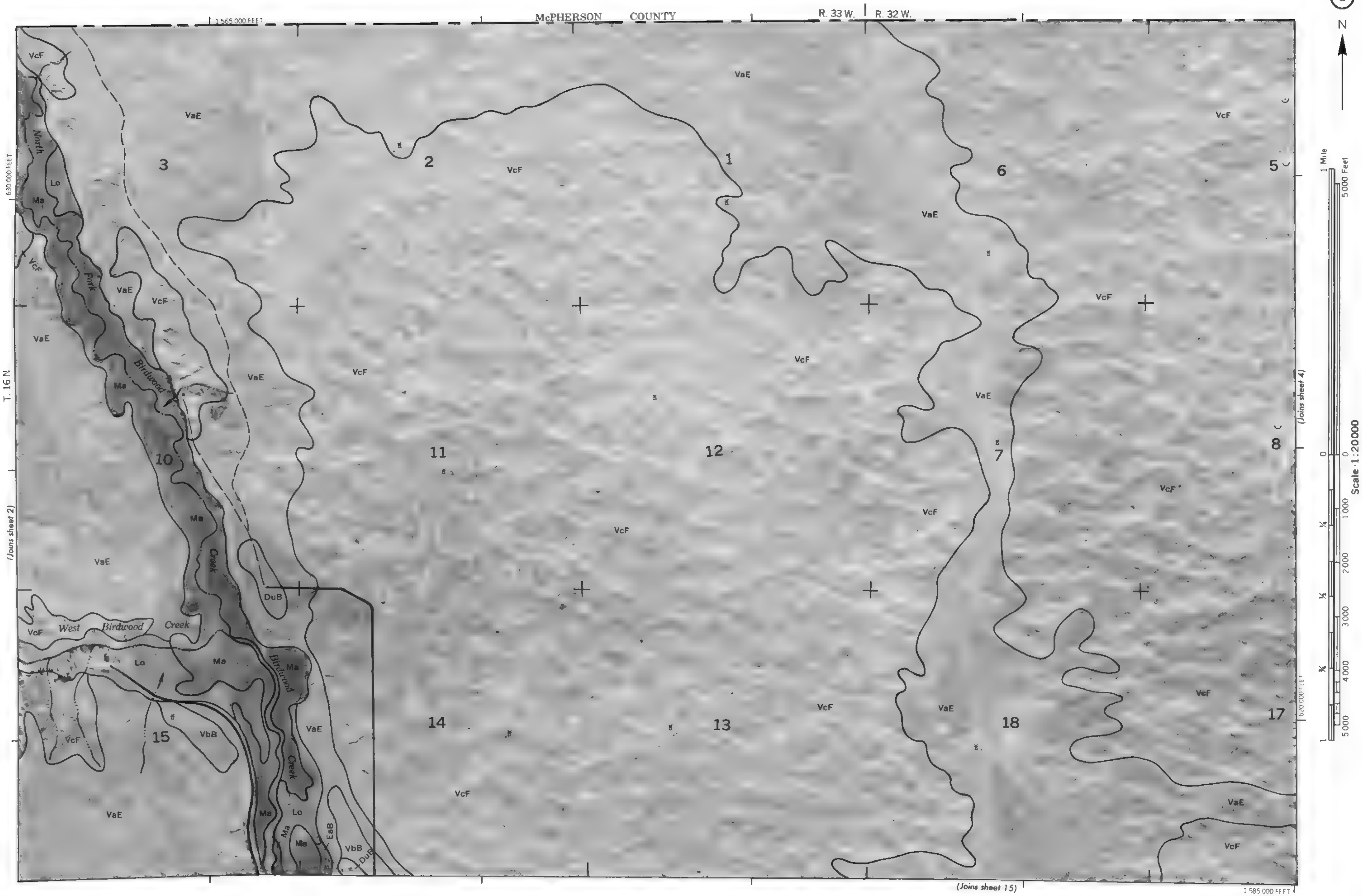
1
N
McPHERSON COUNTY
R. 34 W.
520 000 FEET
630 000 FEET
620 000 FEET
1 535 000 FEET
T. 16 N.
KEITH COUNTY
(Joins sheet 2)
(Joins sheet 13)
West
Birdwood
Creek
6
5
4
3
2
7
8
9
10
11
18
17
16
15
14
VaE
VcF
Lo
Mo
VbB
AnB
VeB
DvC
DuB
veB
Scale 1:20000
1 Mile
5000 Feet

LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 2



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 2



LINCOLN COUNTY, NEBRASKA NO. 3
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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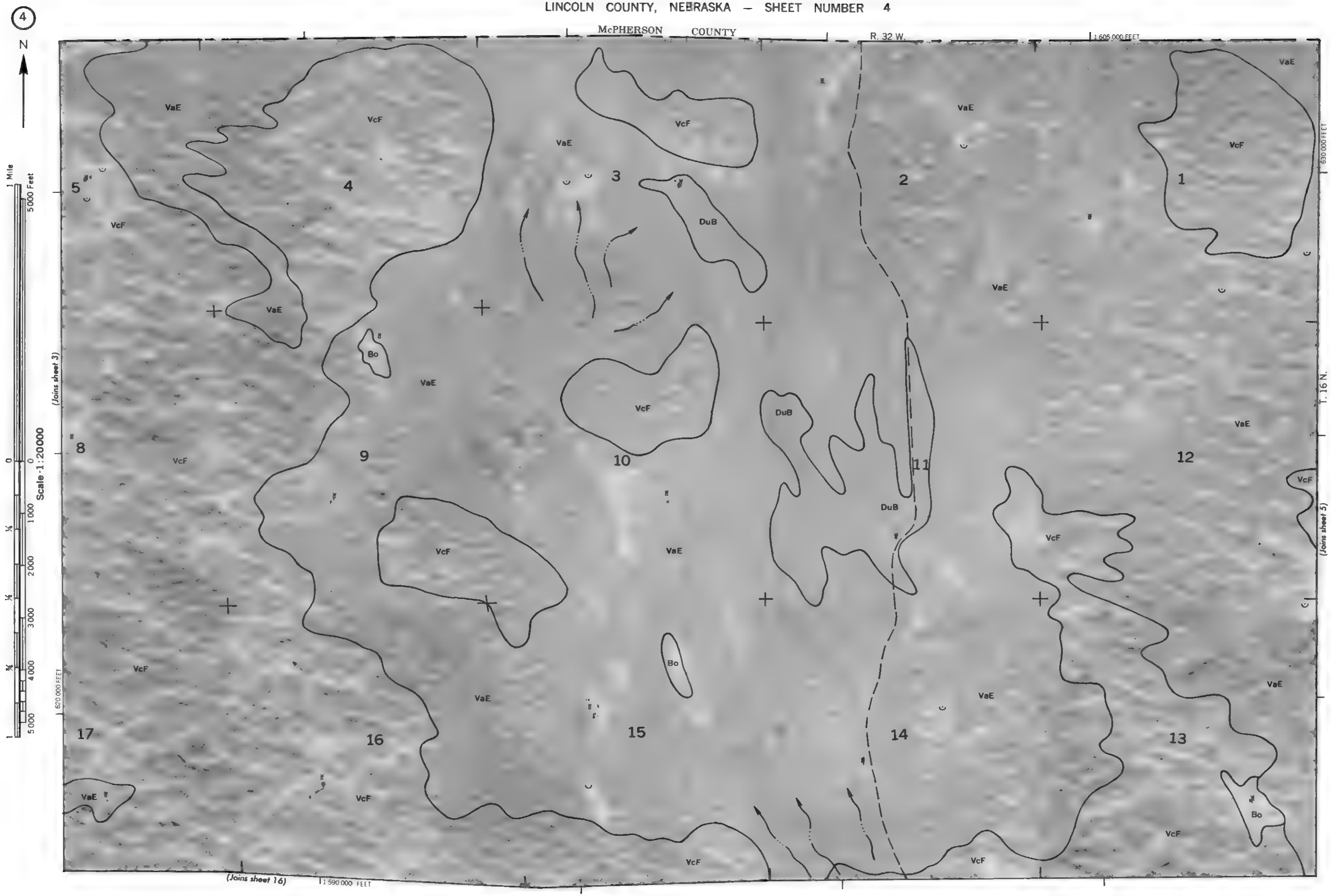
LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 4



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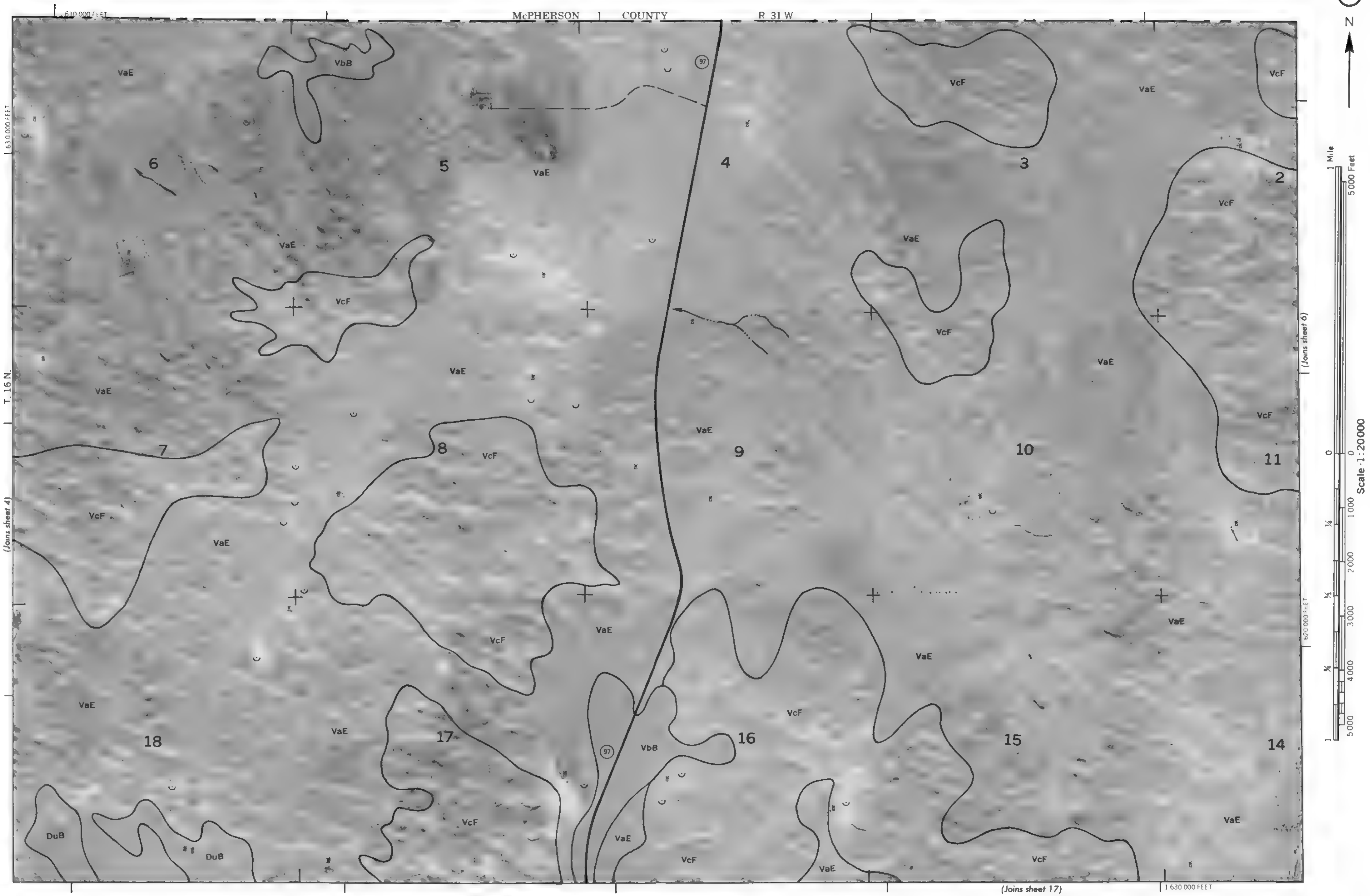
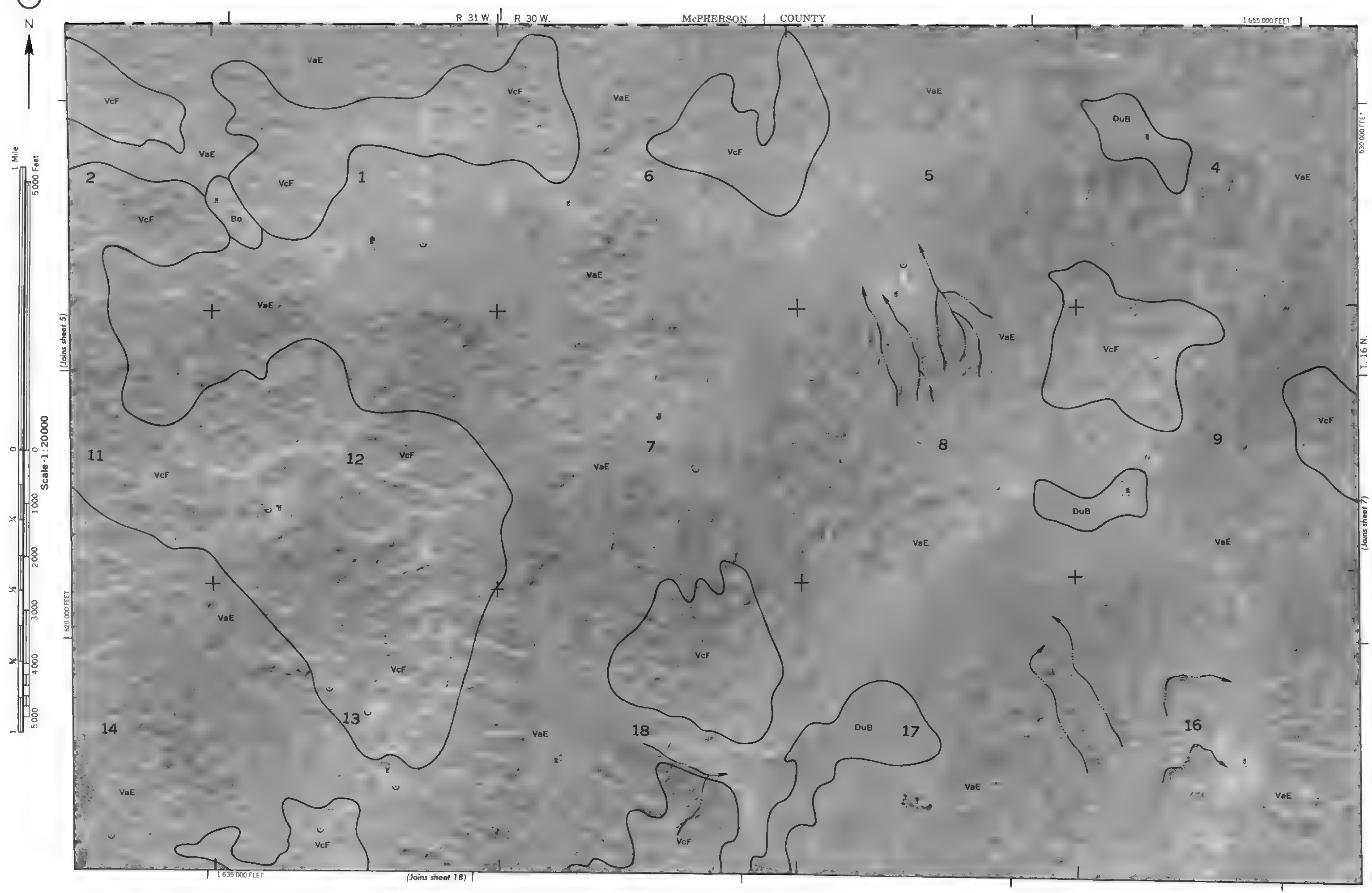
LINCOLN COUNTY, NEBRASKA NO. 4



LINCOLN COUNTY, NEBRASKA NO. 5

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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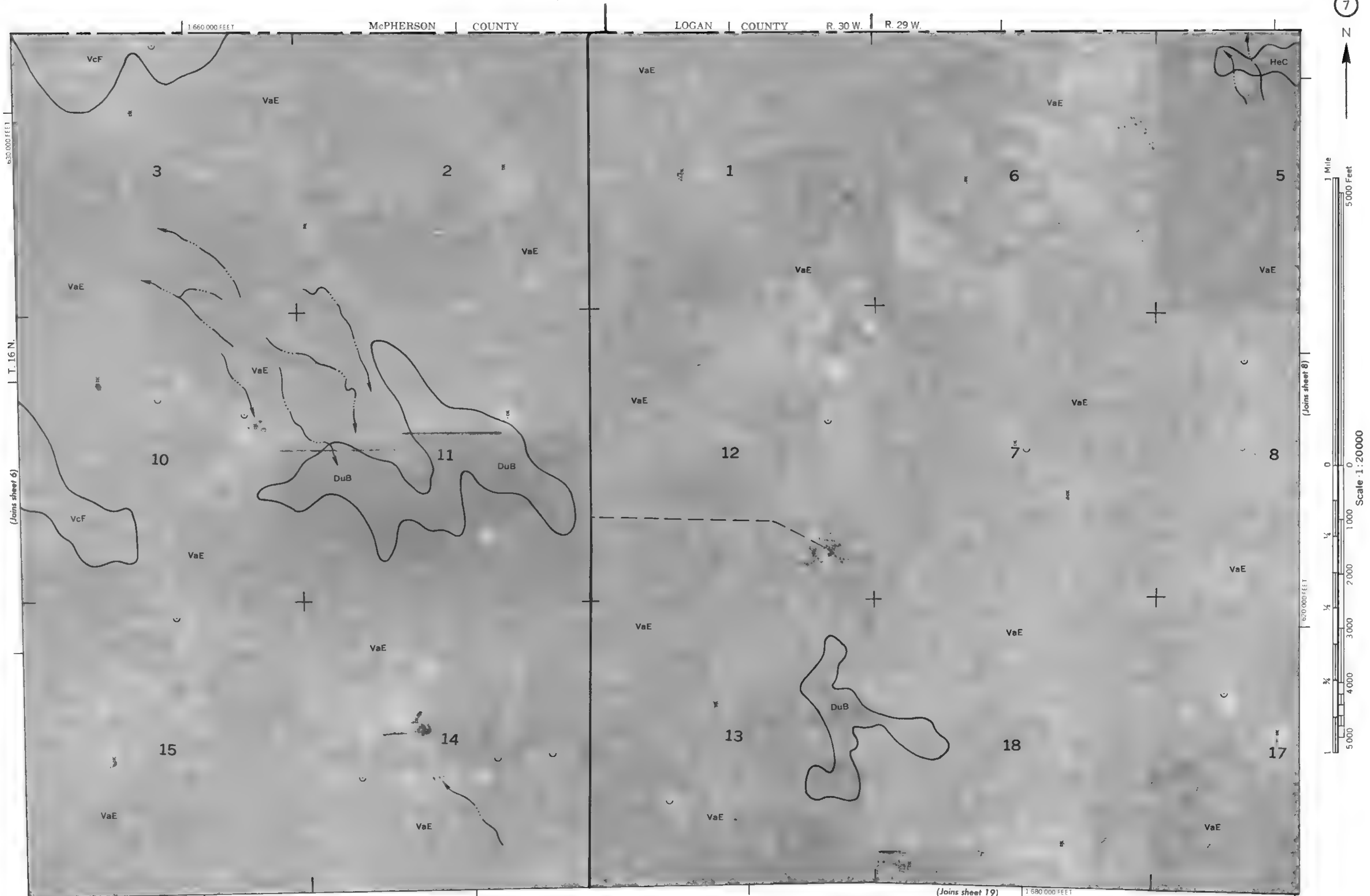
LINCOLN COUNTY, NEBRASKA NO. 6



LINCOLN COUNTY, NEBRASKA

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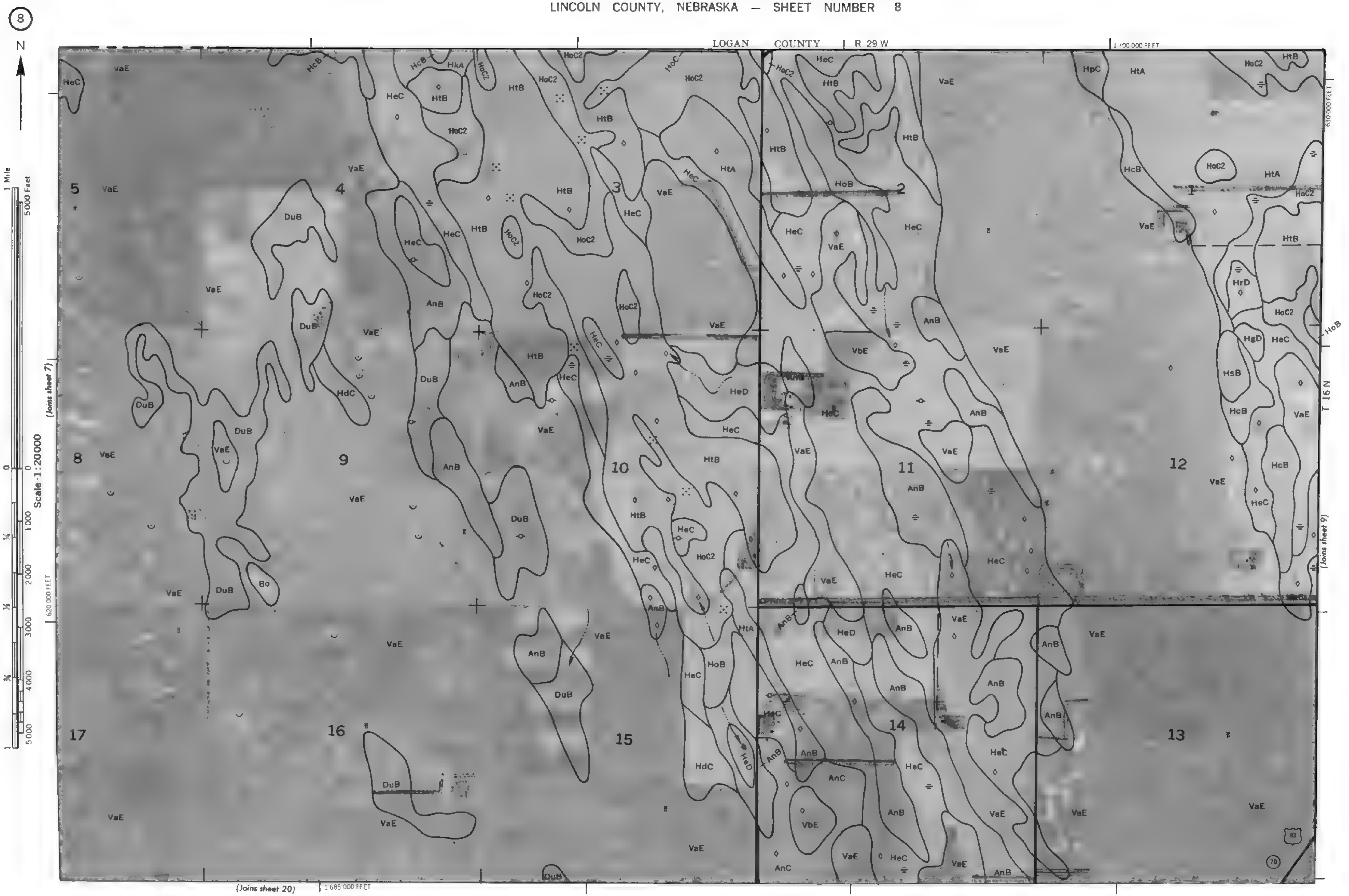
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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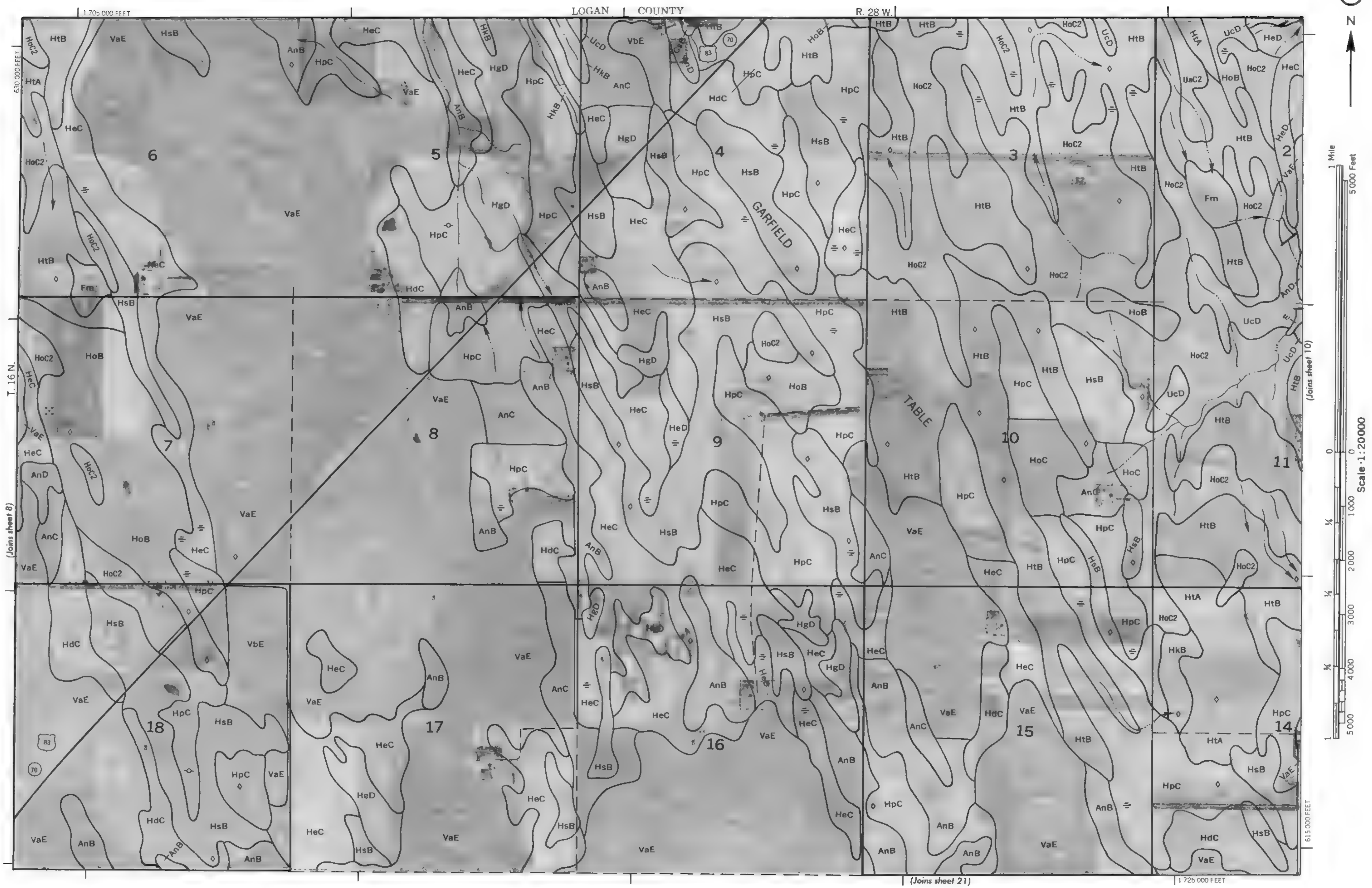
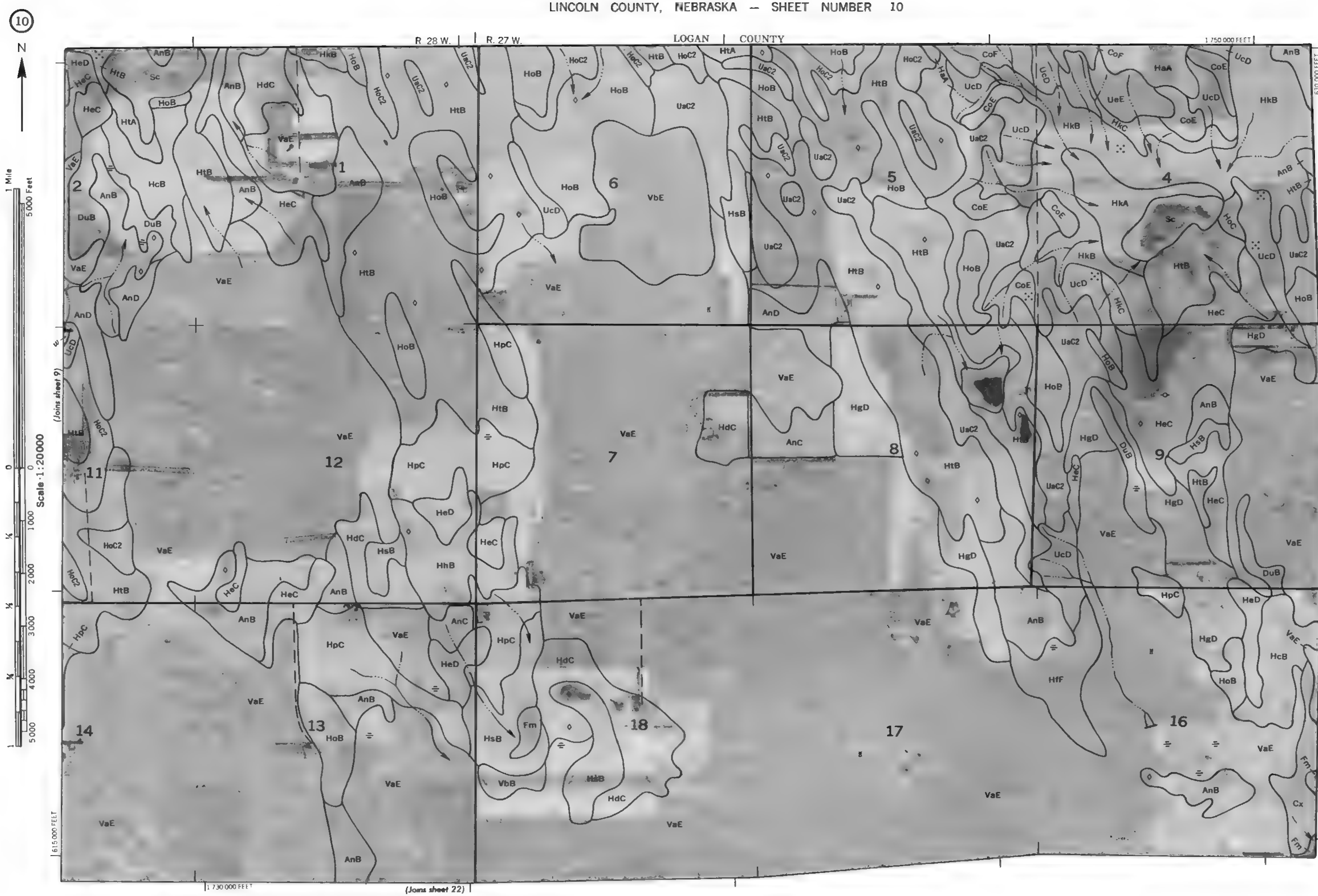


LINCOLN COUNTY, NEBRASKA NO. 9

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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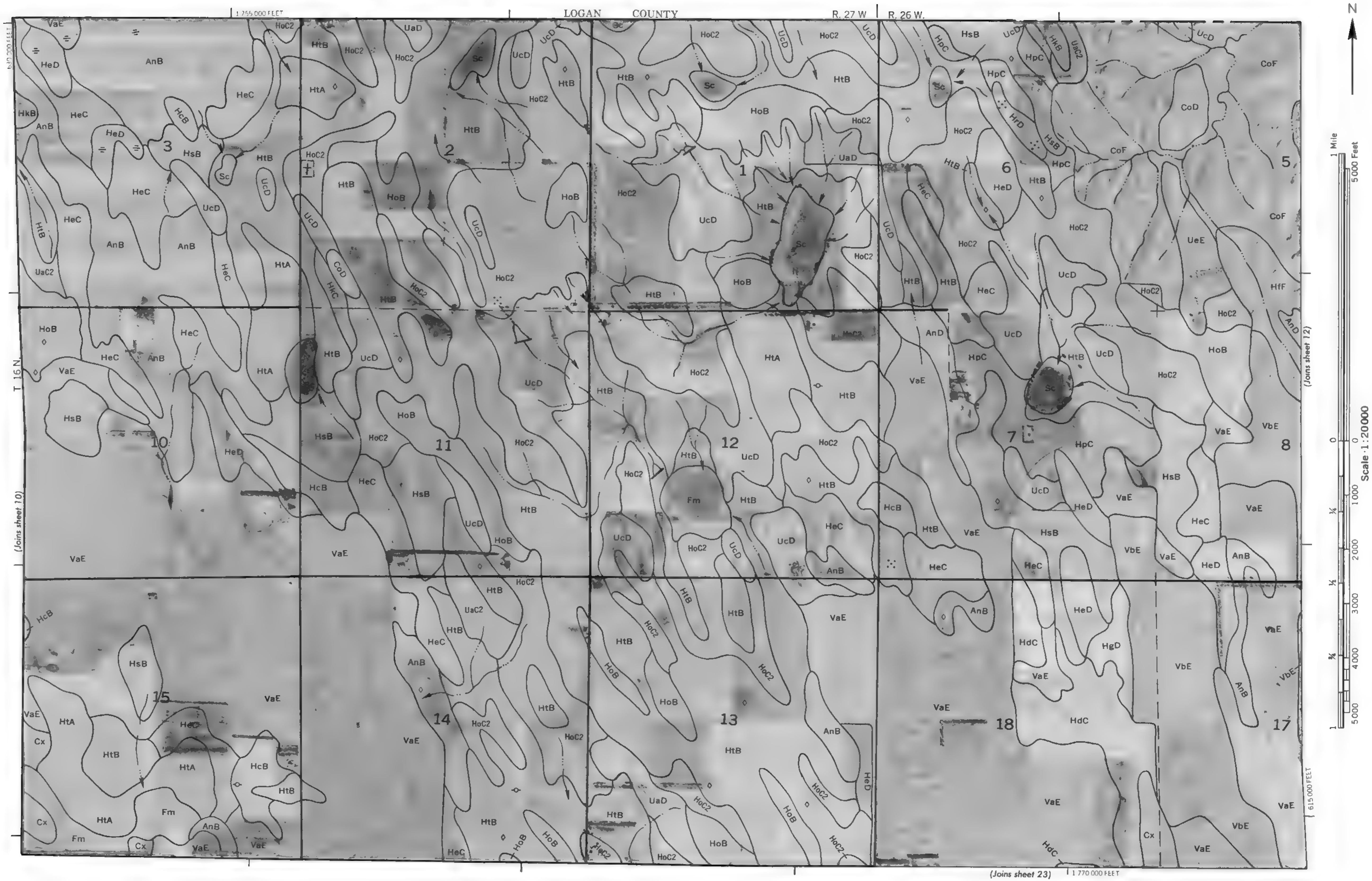
LINCOLN COUNTY, NEBRASKA NO. 10



LINCOLN COUNTY, NEBRASKA NO. 11

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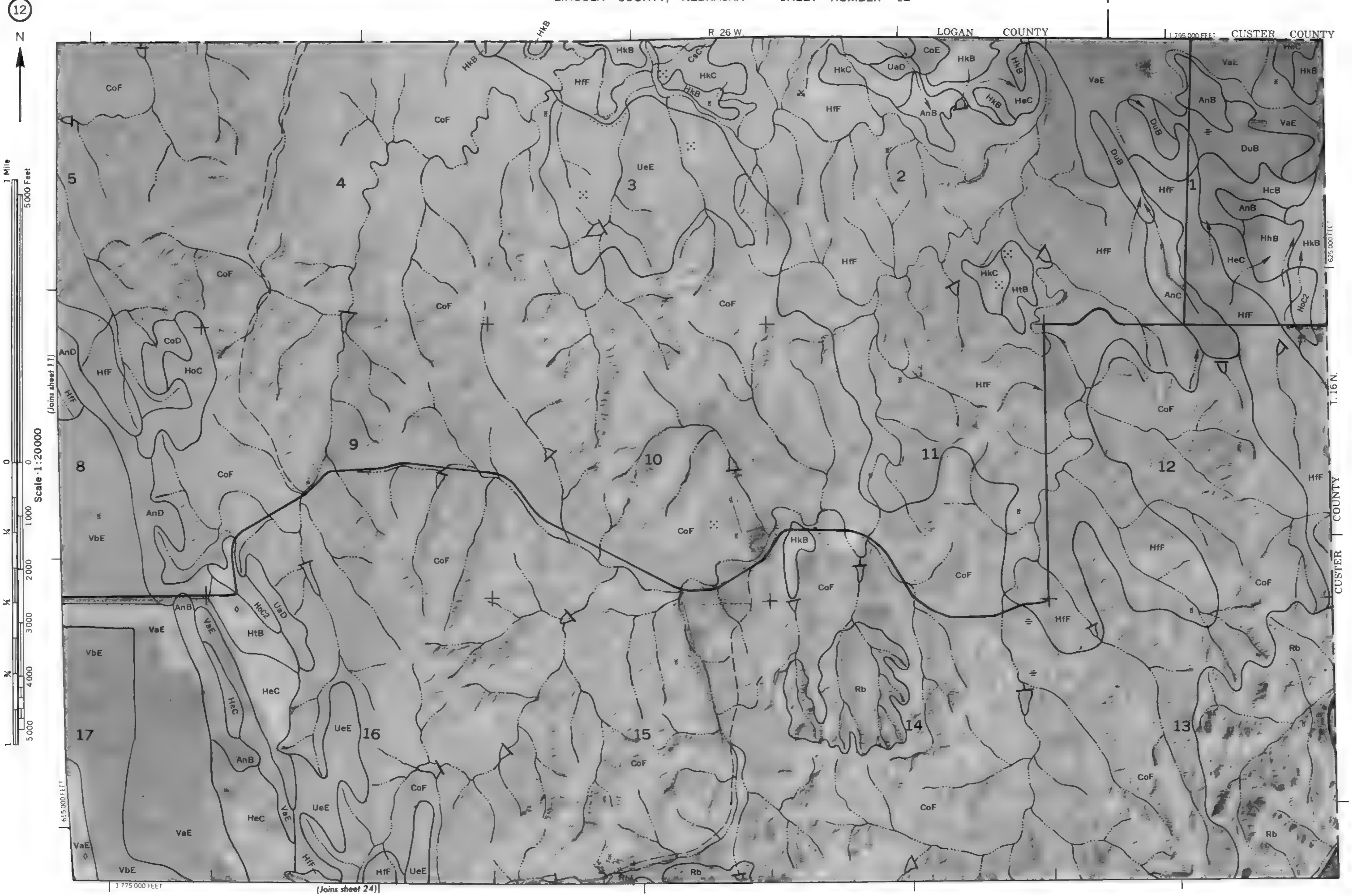

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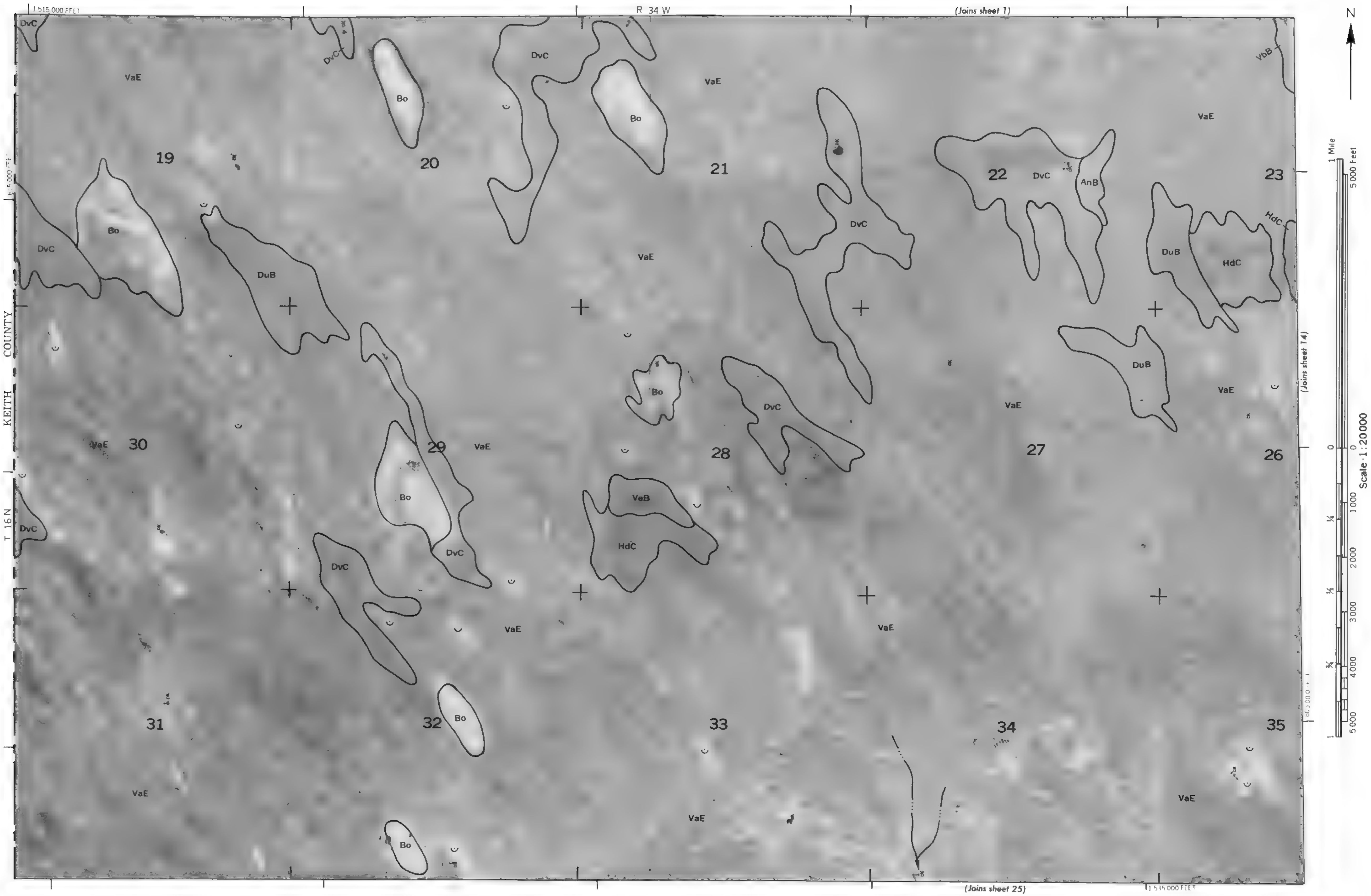
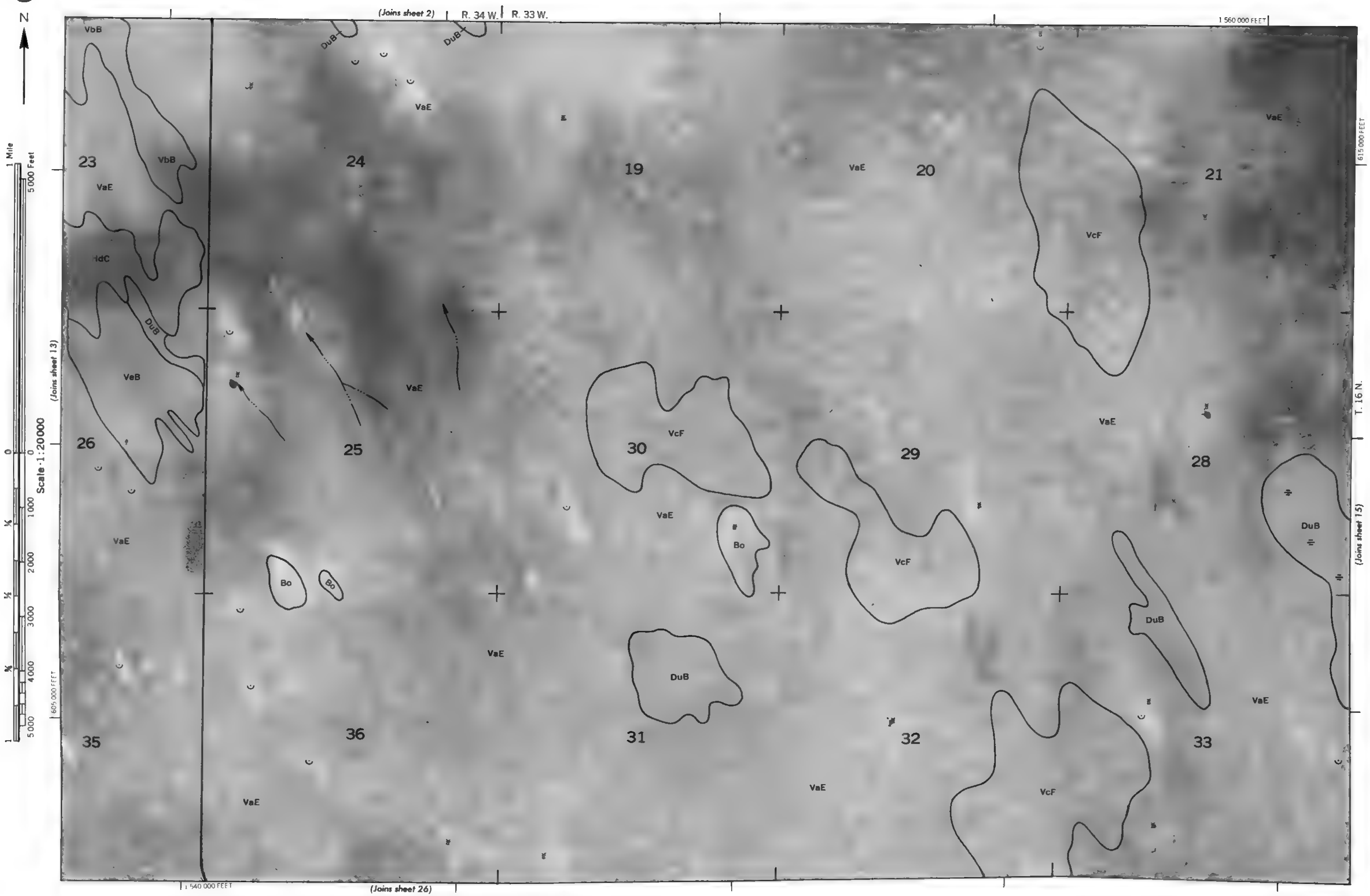
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 12



LINCOLN COUNTY, NEBRASKA NO. 13



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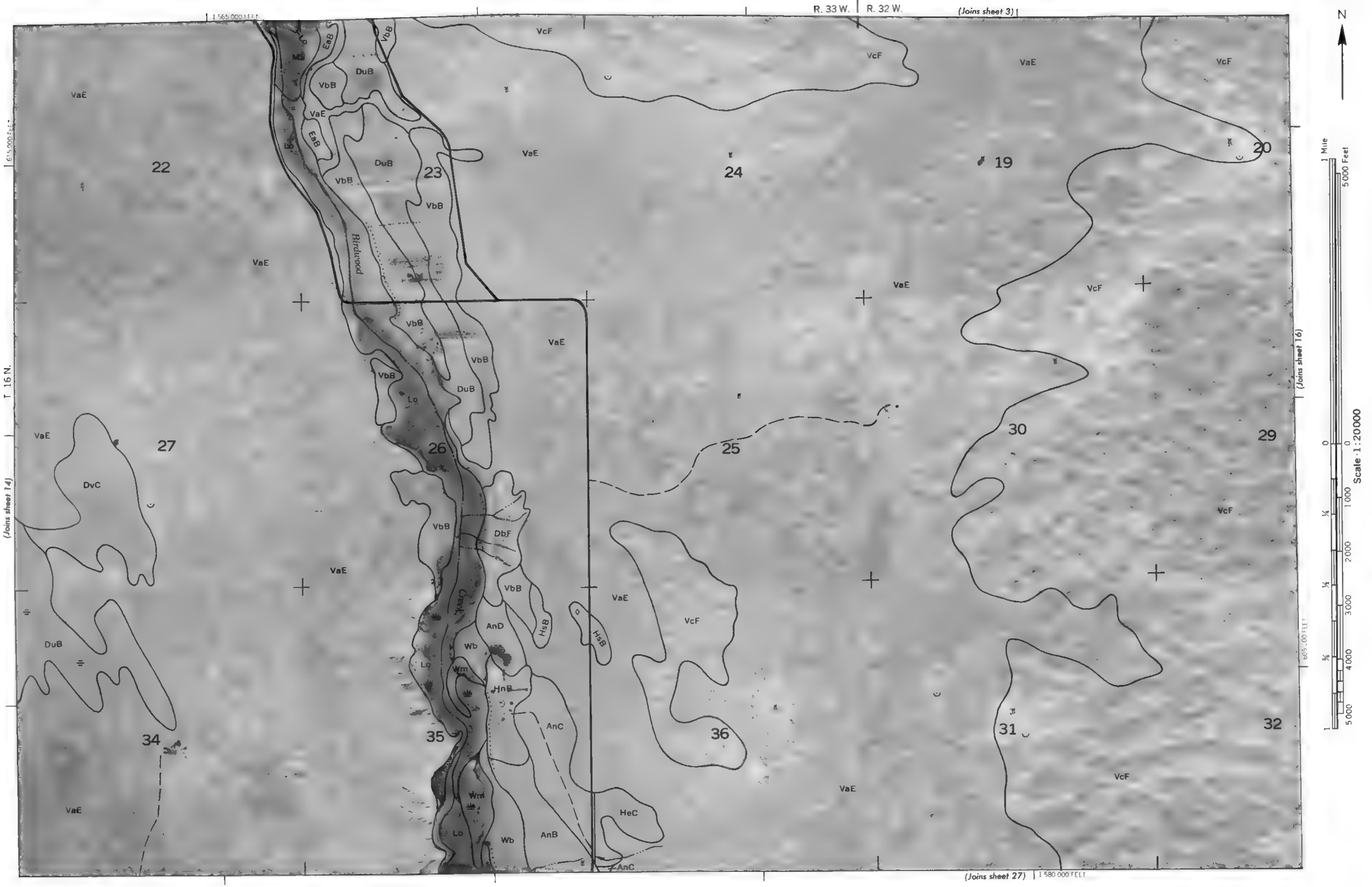

LINCOLN COUNTY, NEBRASKA NO. 15

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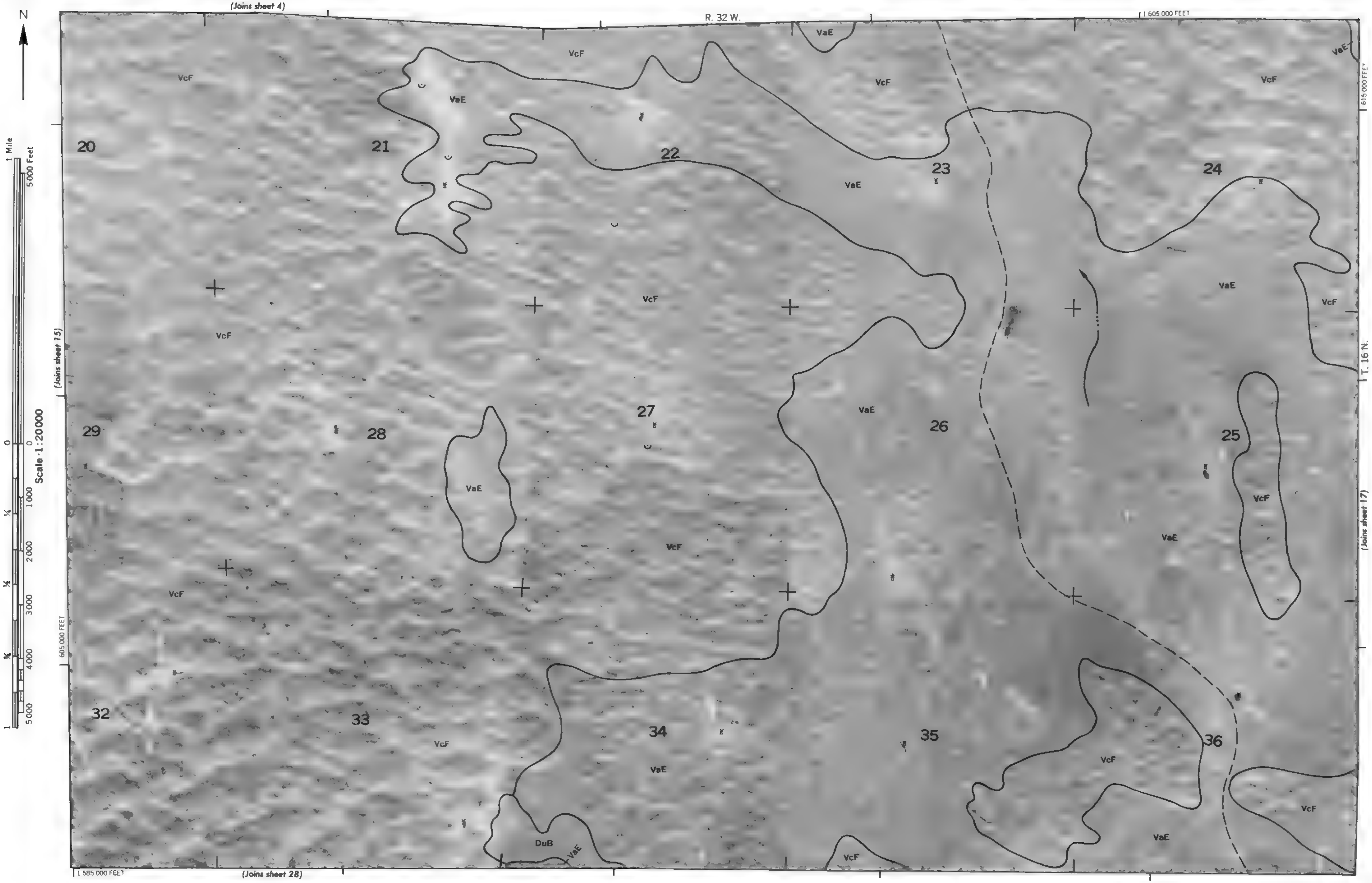

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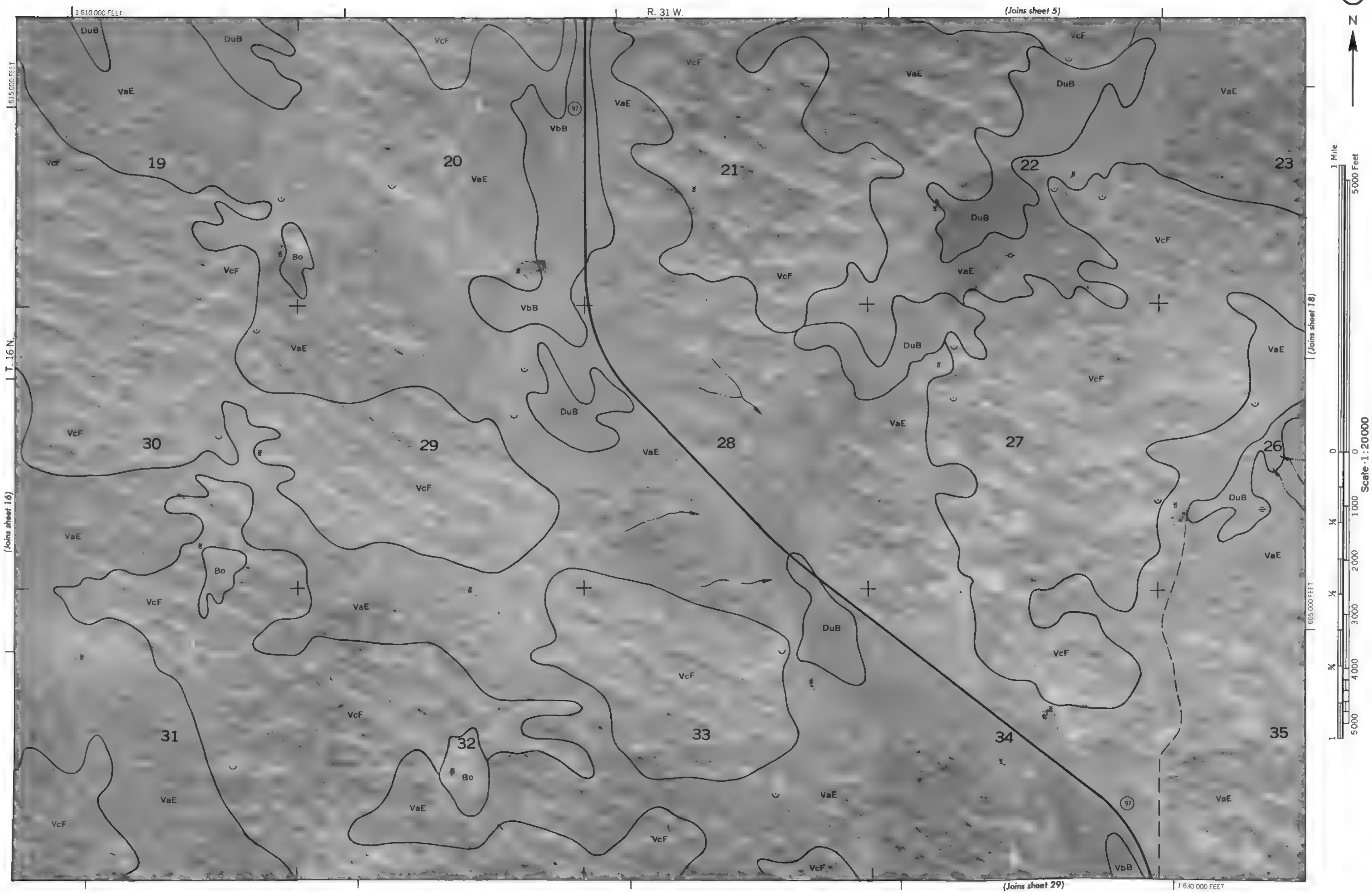

LINCOLN COUNTY, NEBRASKA NO. 17

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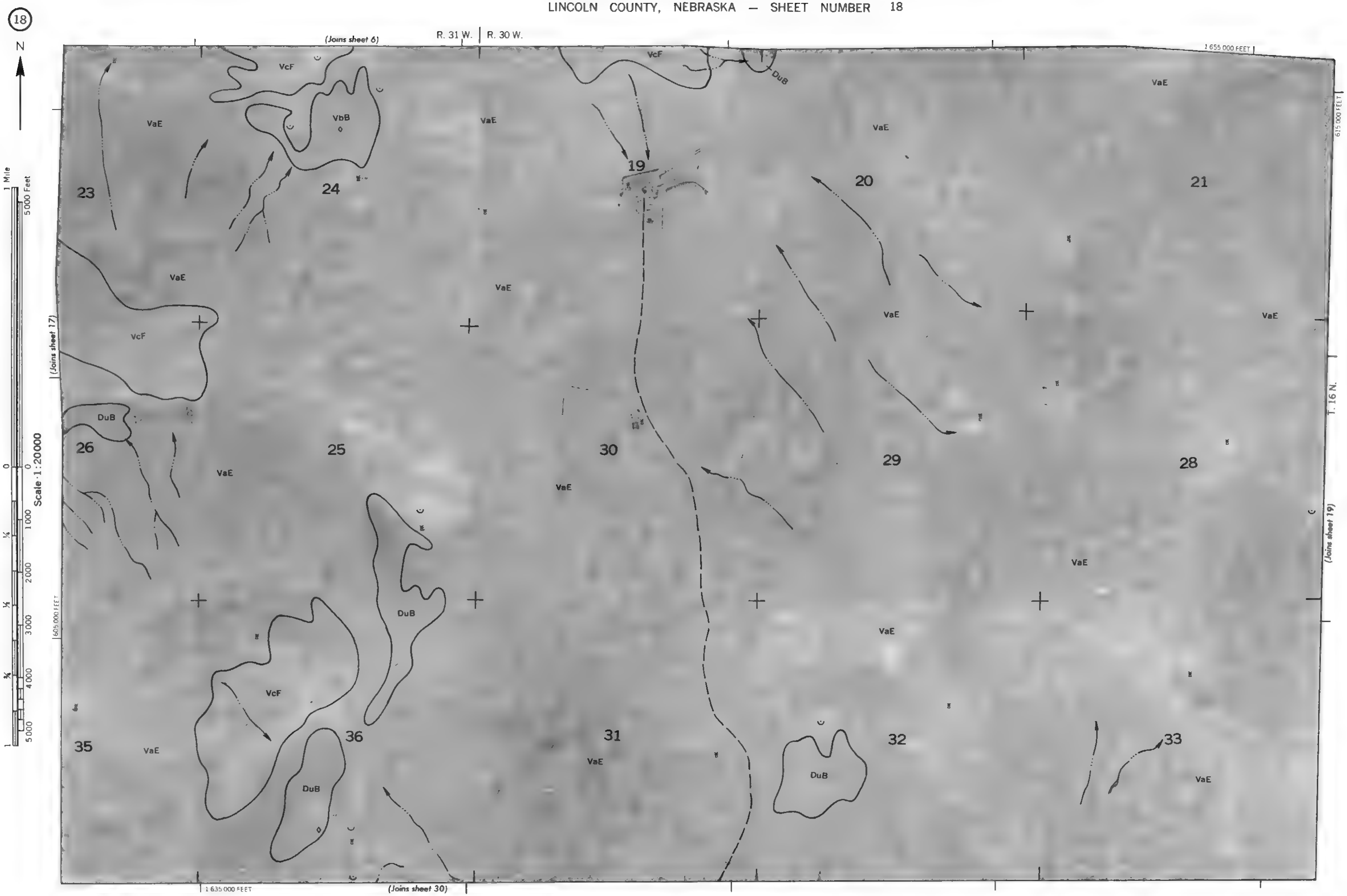

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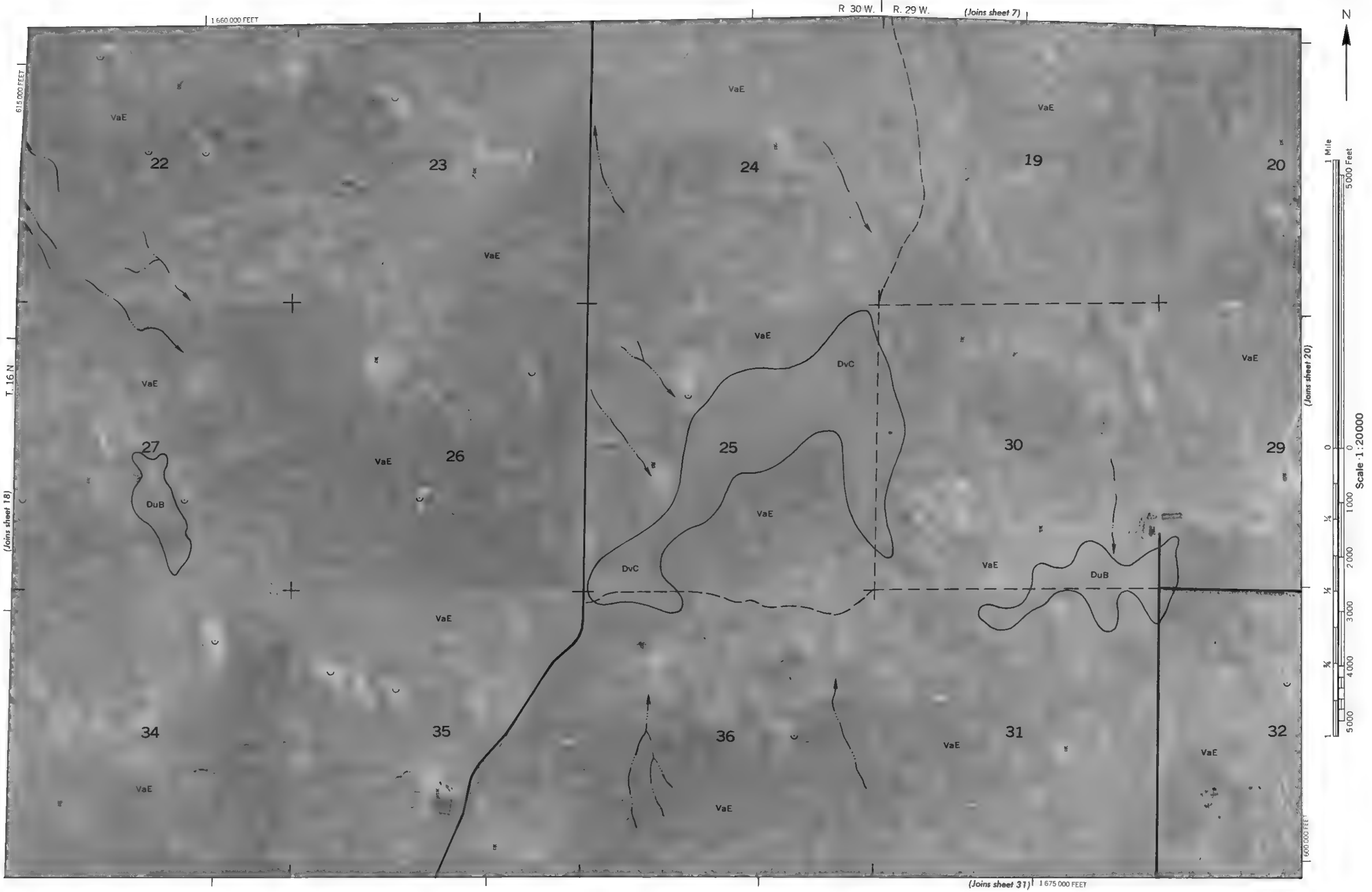
LINCOLN COUNTY, NEBRASKA NO. 18



LINCOLN COUNTY, NEBRASKA NO. 19

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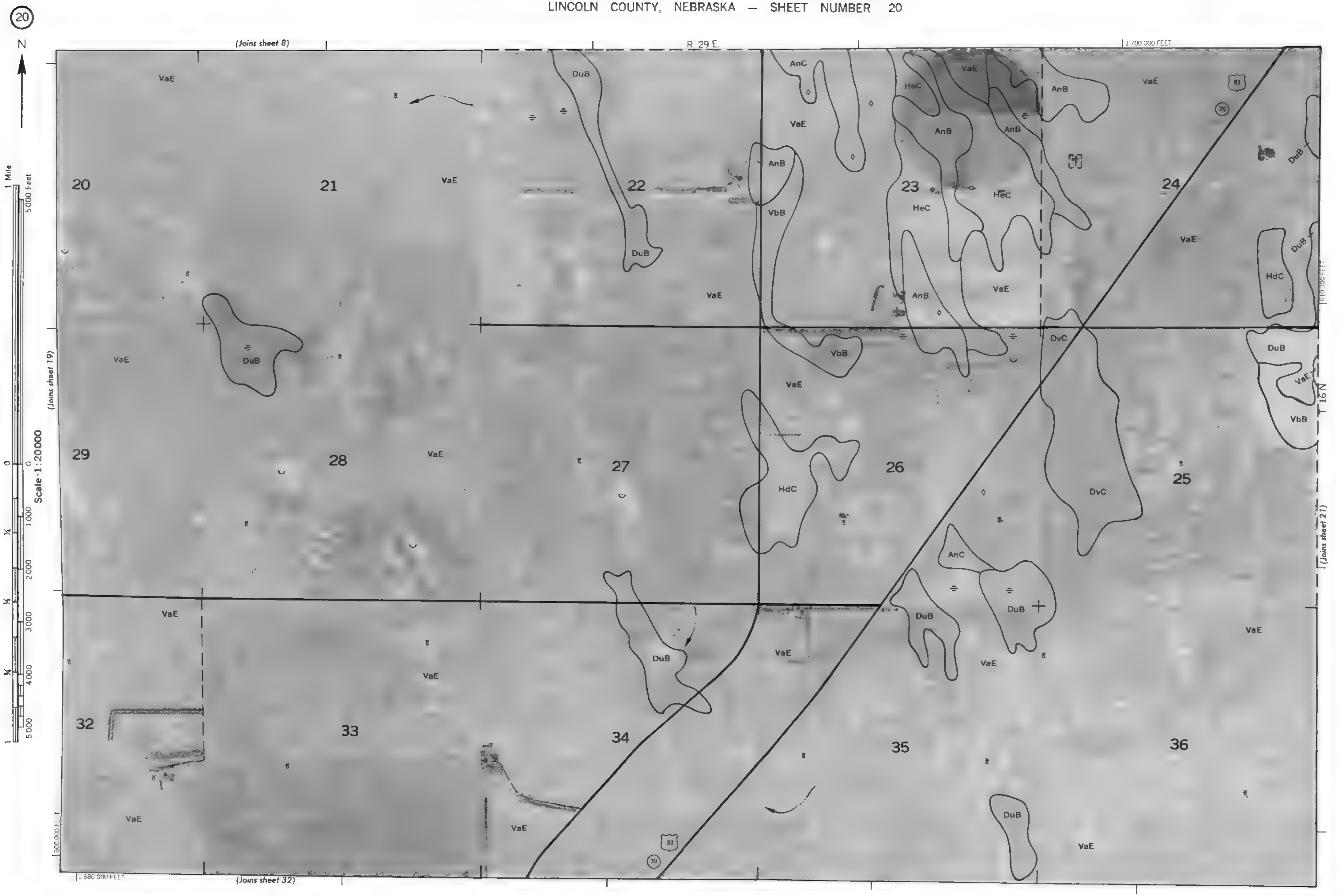

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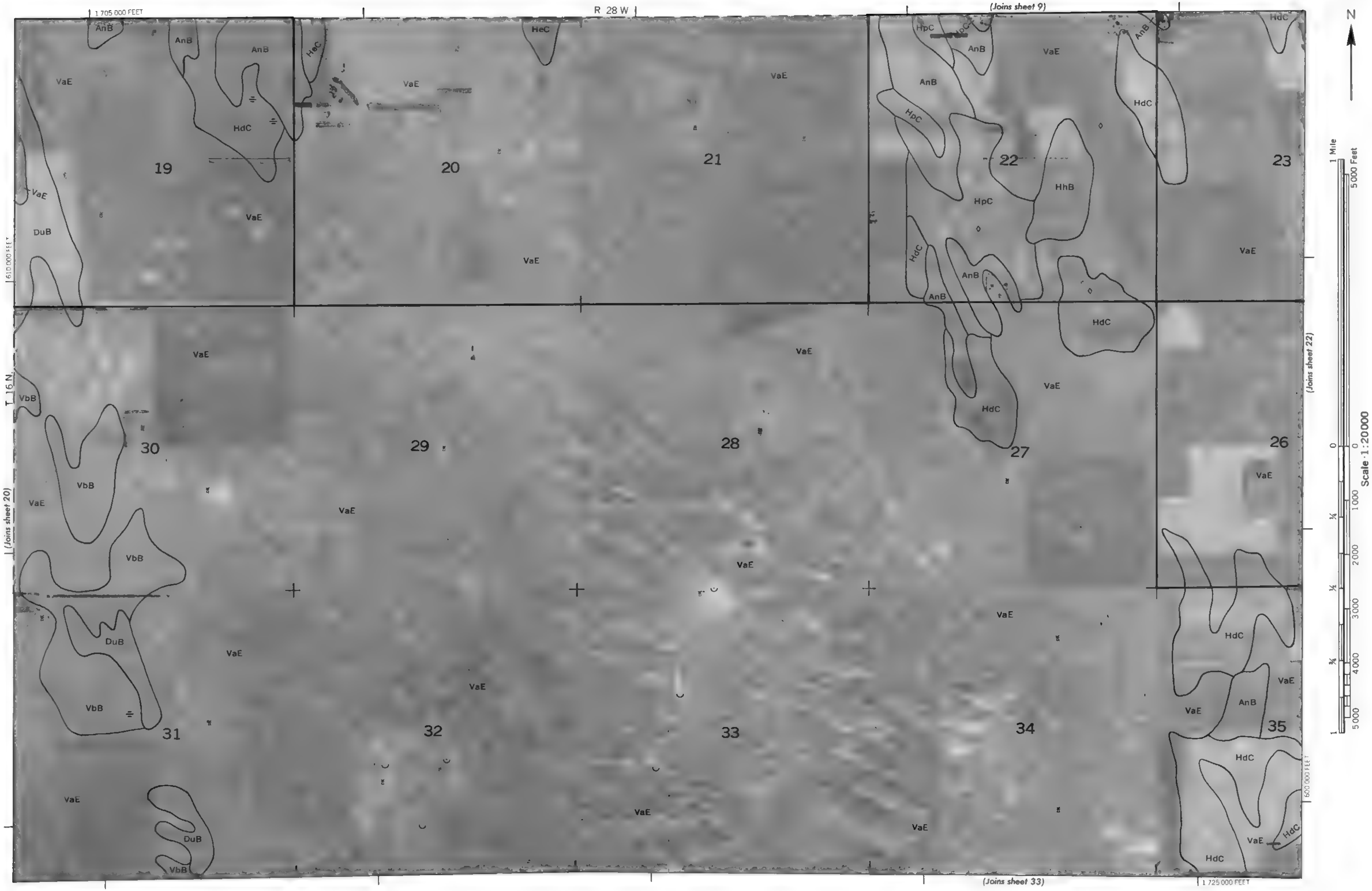
LINCOLN COUNTY, NEBRASKA NO. 20



LINCOLN COUNTY, NEBRASKA NO. 21

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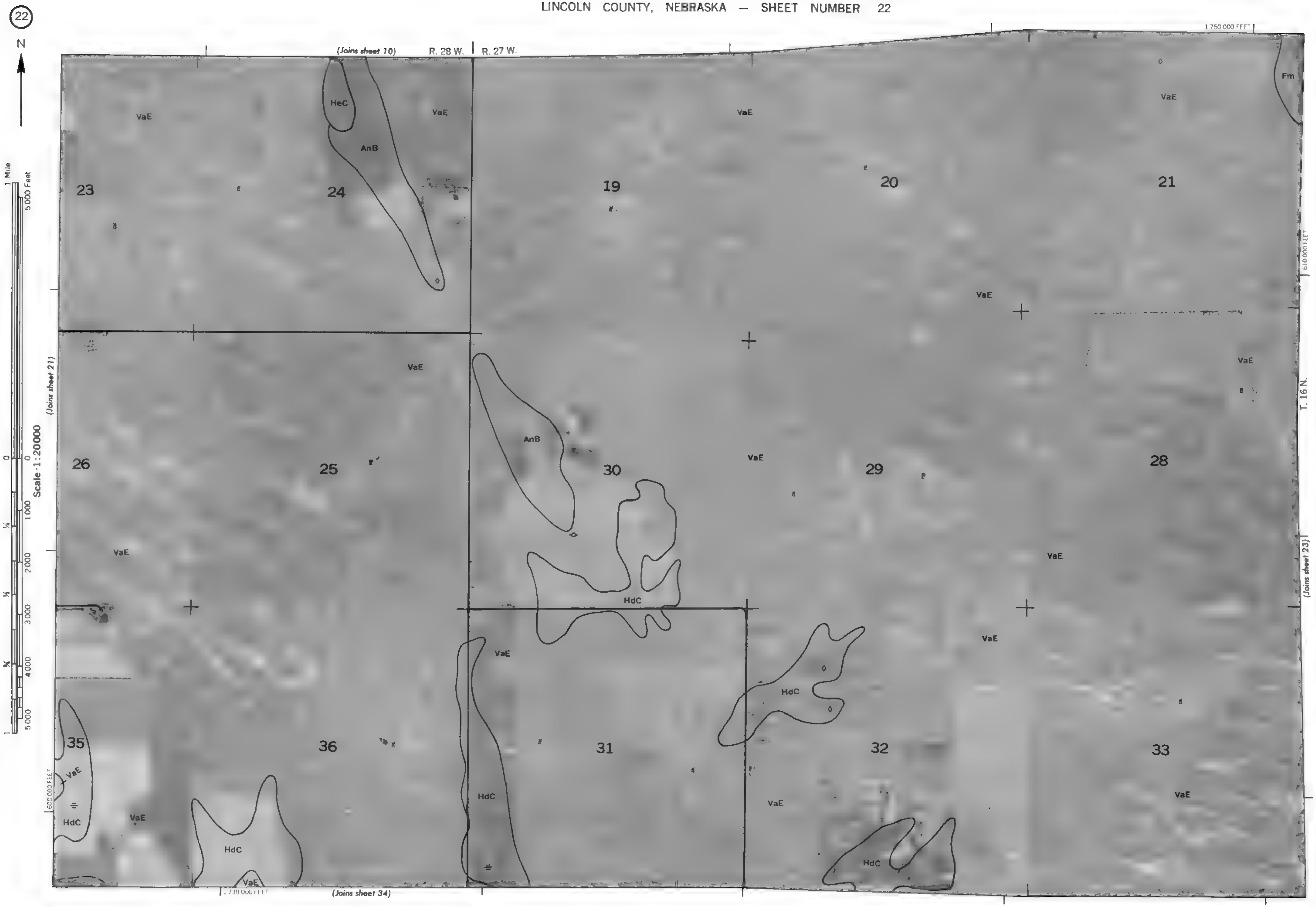
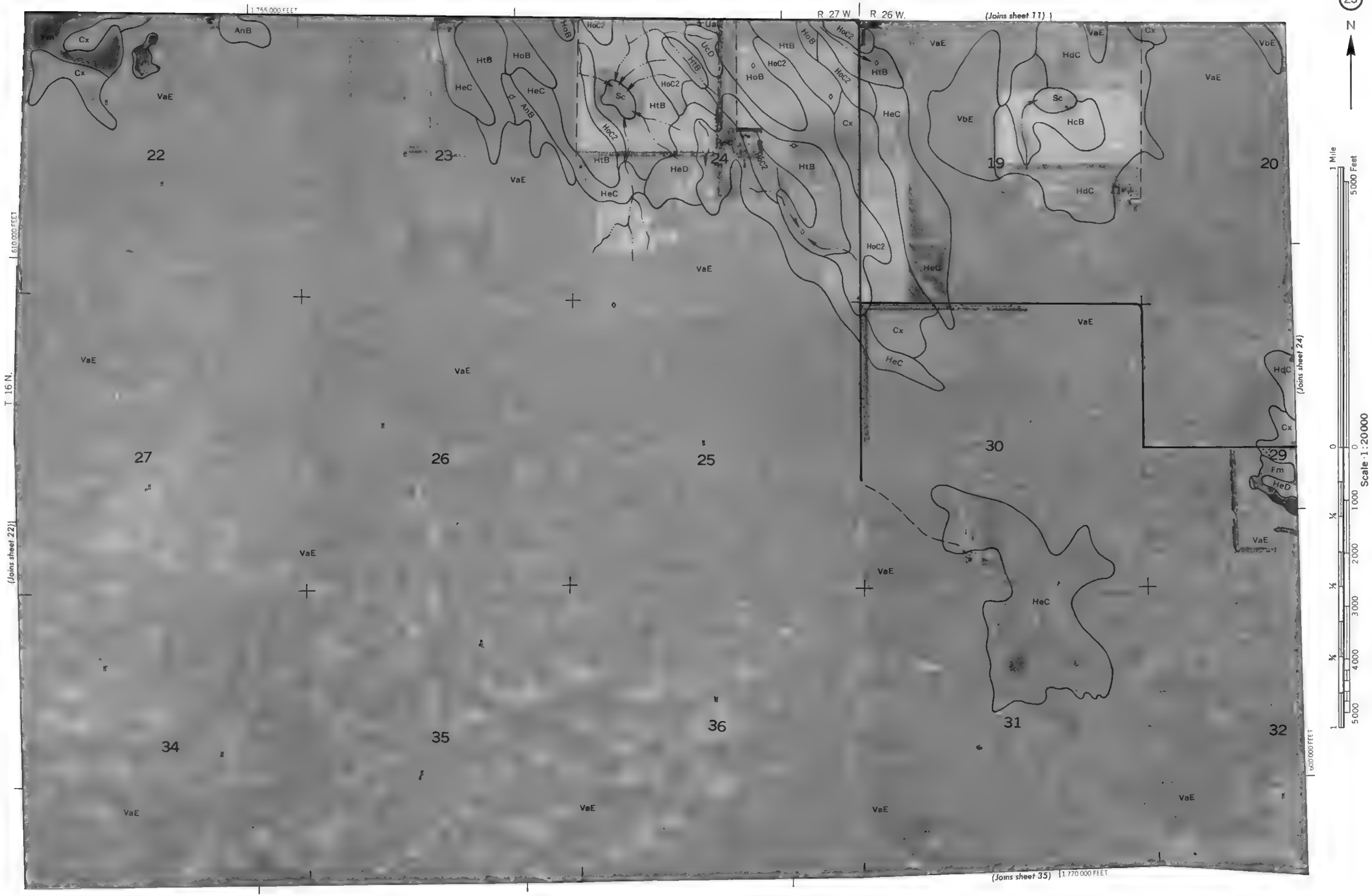


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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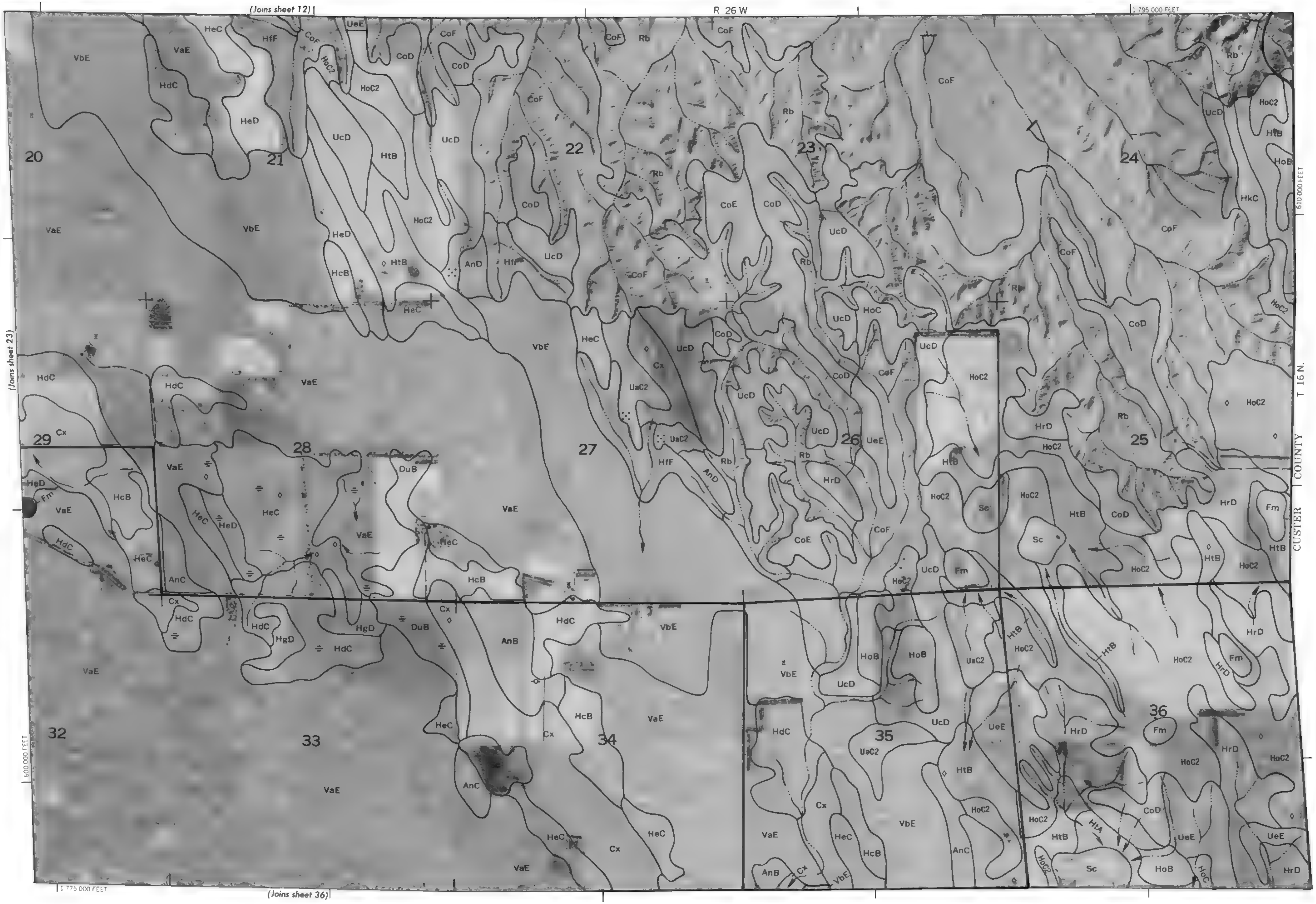

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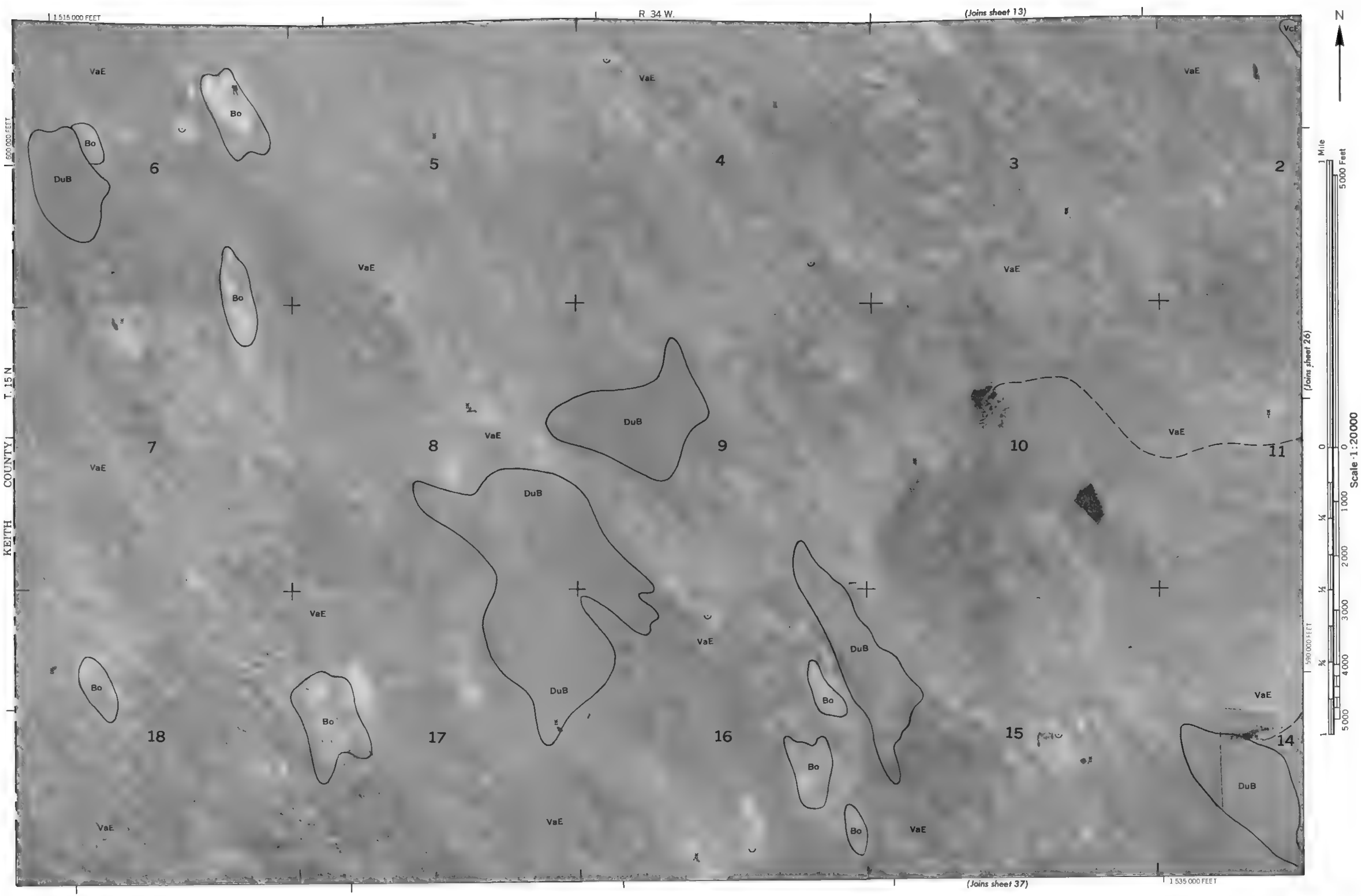

LINCOLN COUNTY, NEBRASKA NO. 25

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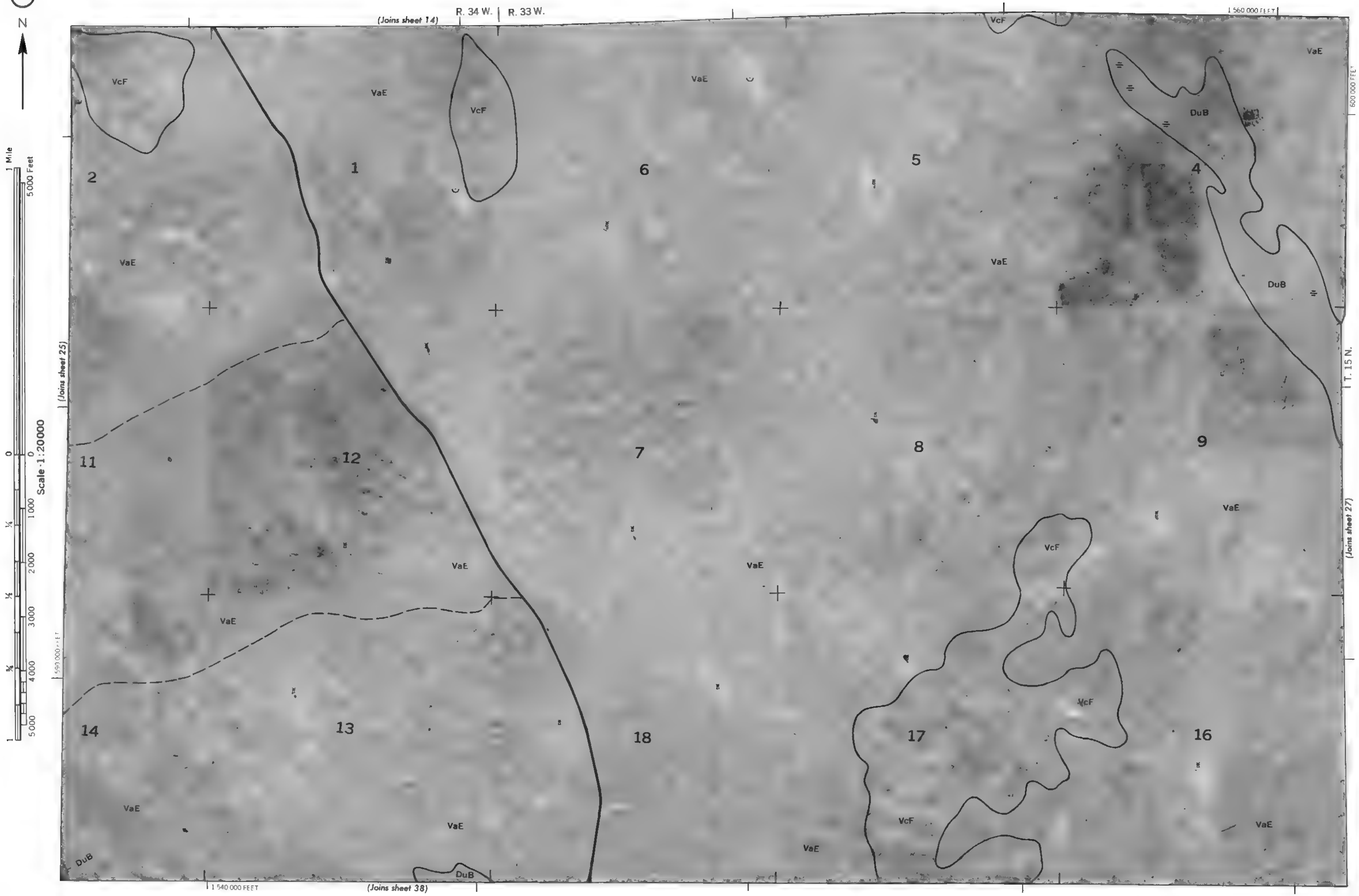

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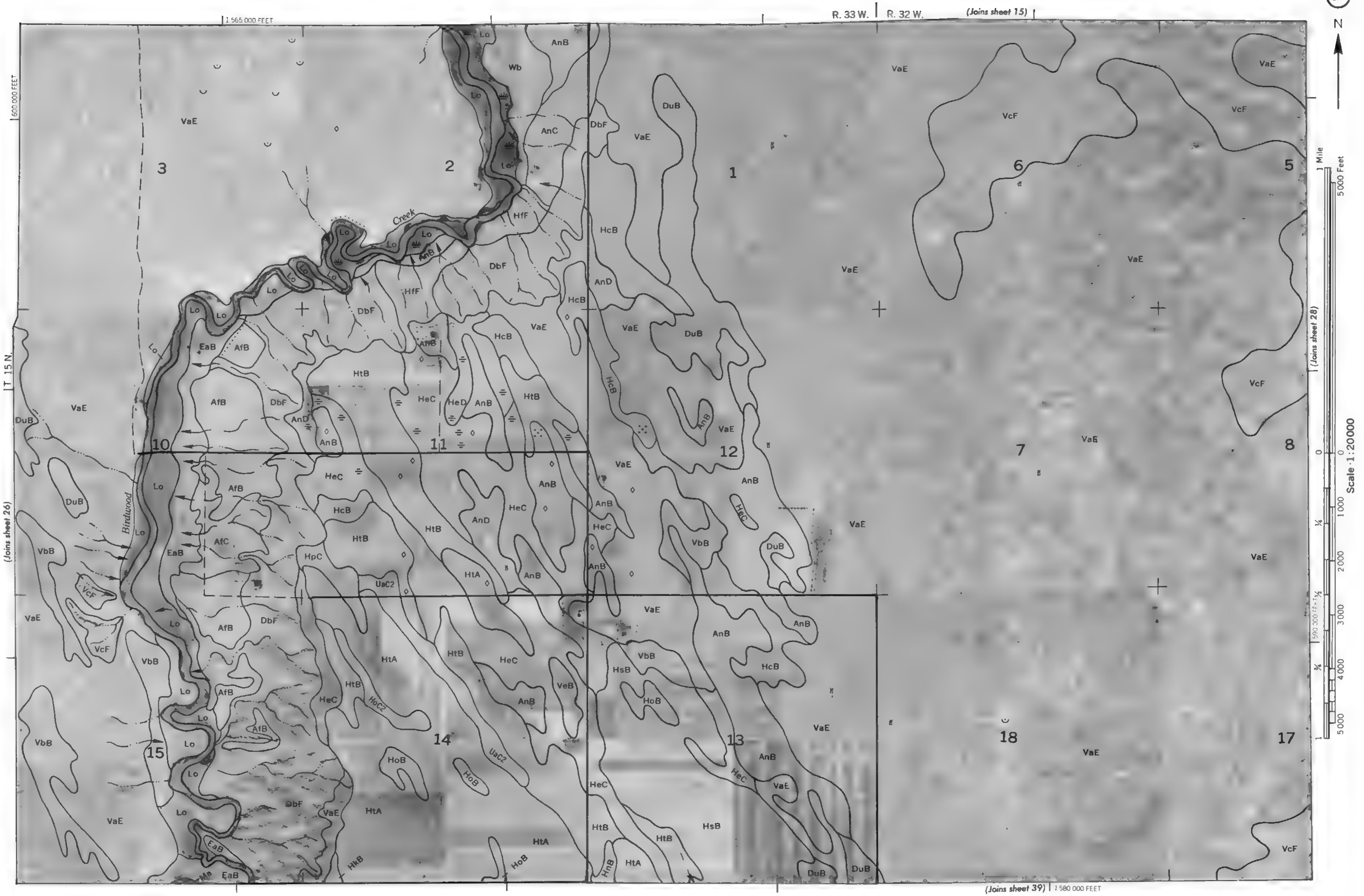
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY, NEBRASKA NO. 26



LINCOLN COUNTY, NEBRASKA NO. 27

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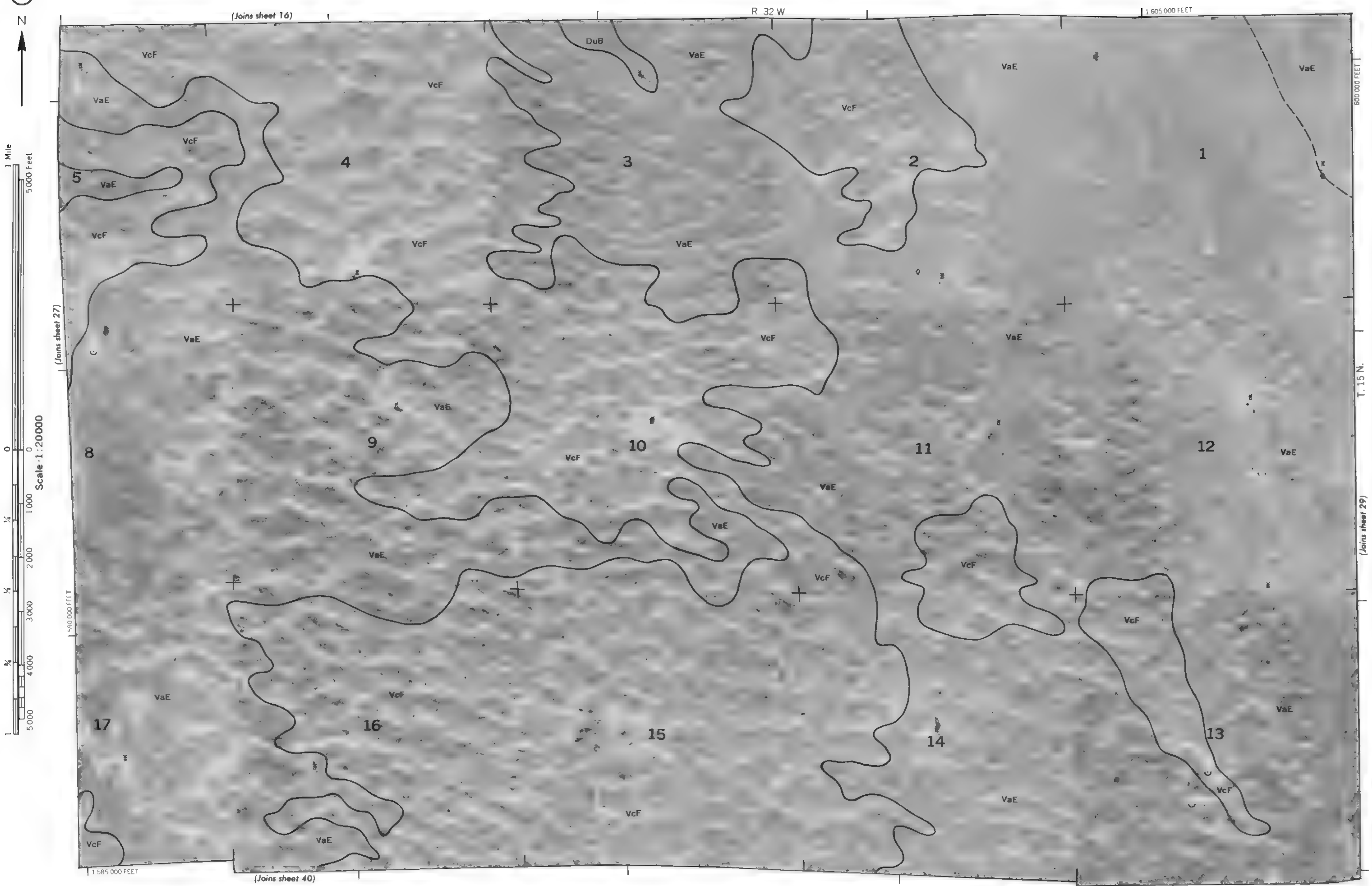

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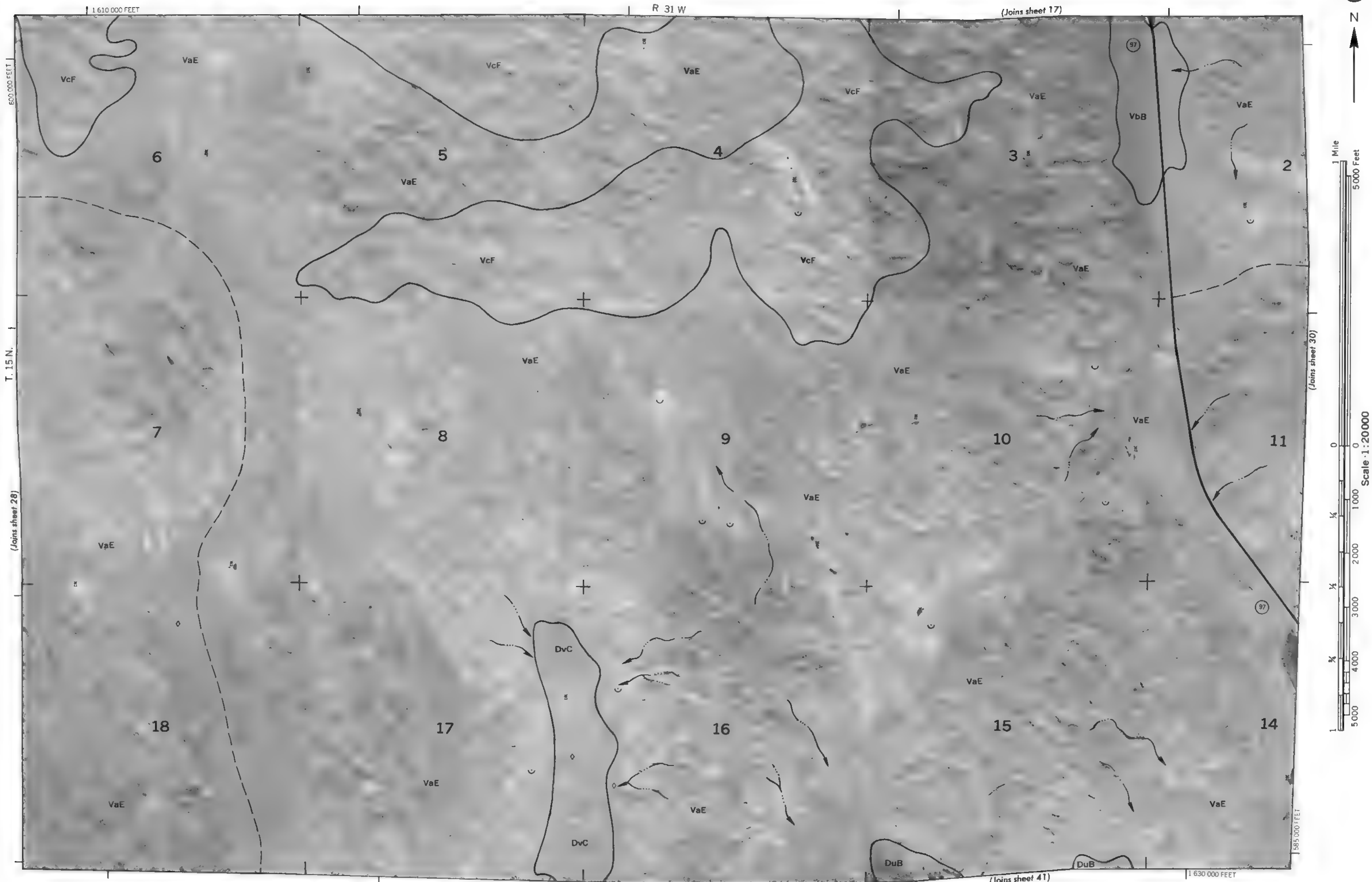
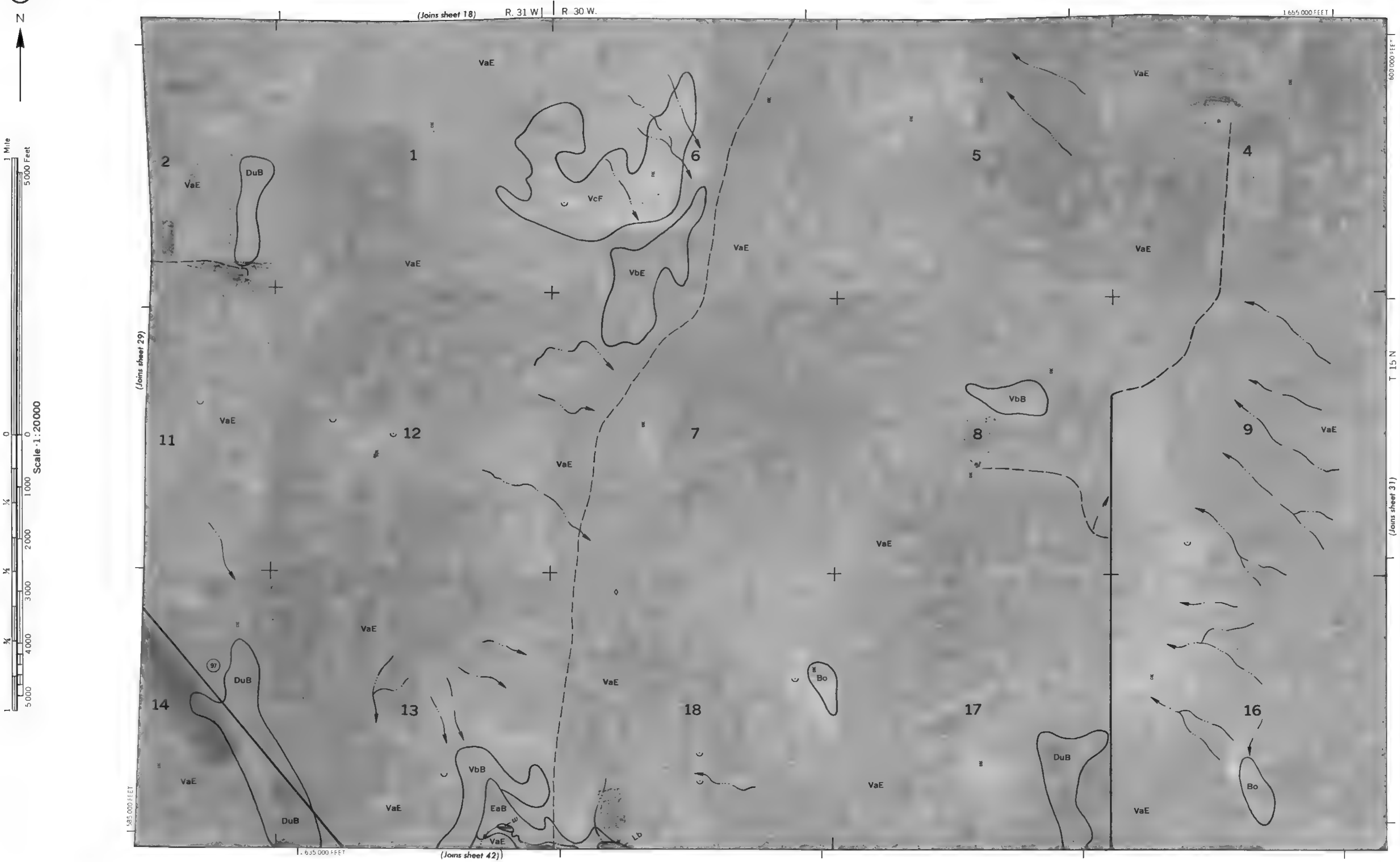
LINCOLN COUNTY, NEBRASKA NO. 28



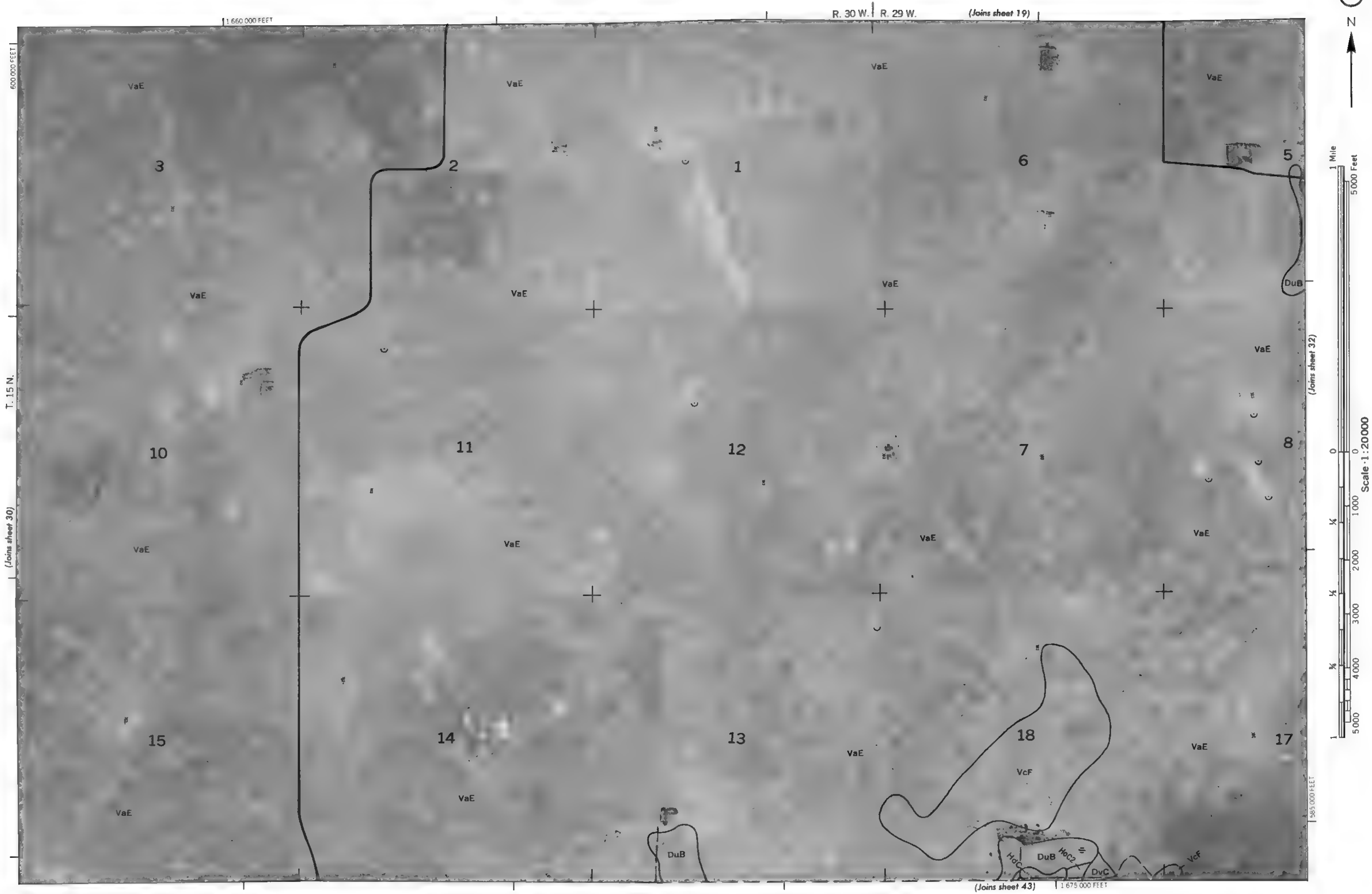
LINCOLN COUNTY, NEBRASKA NO. 29

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



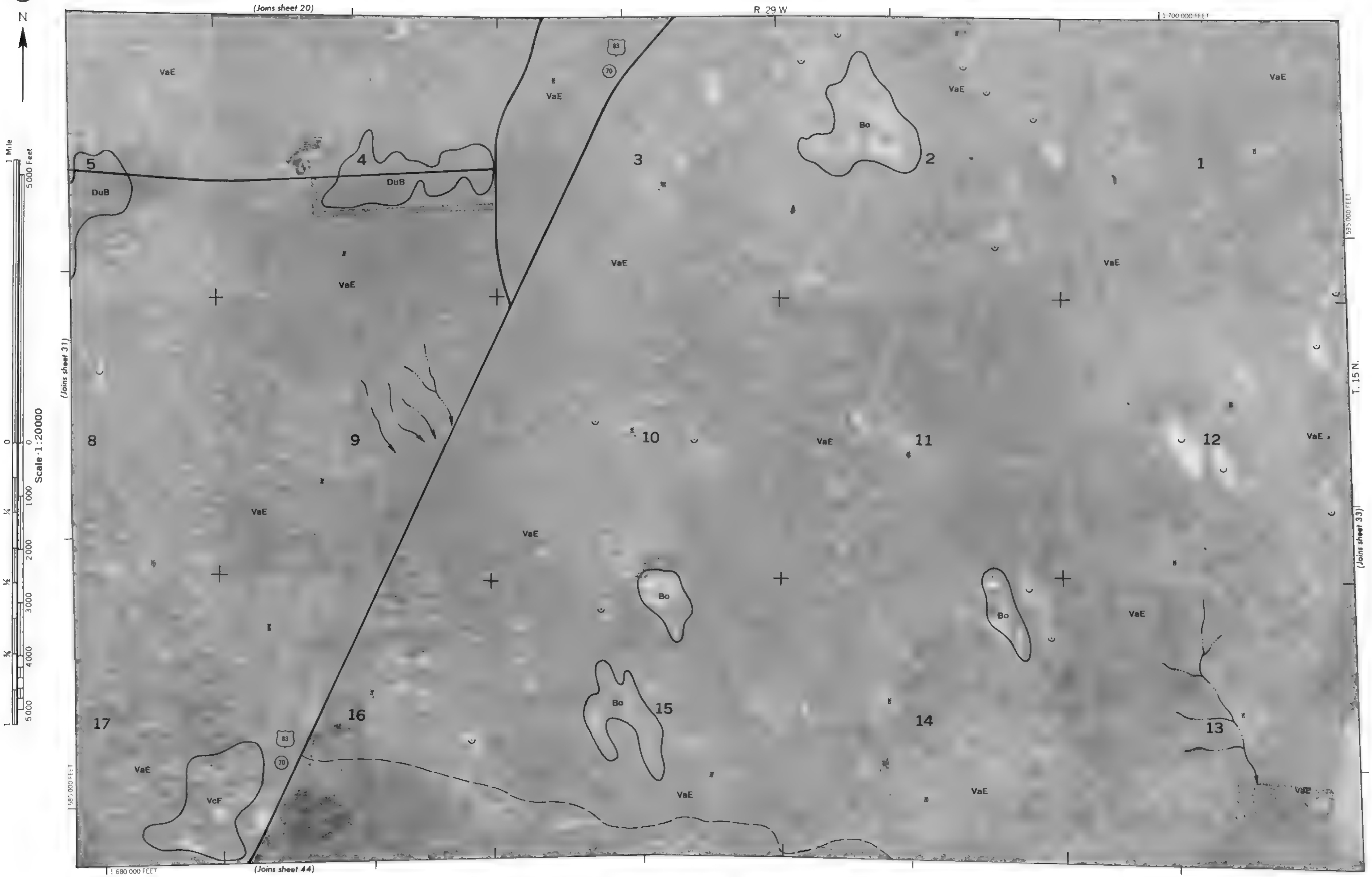
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 30



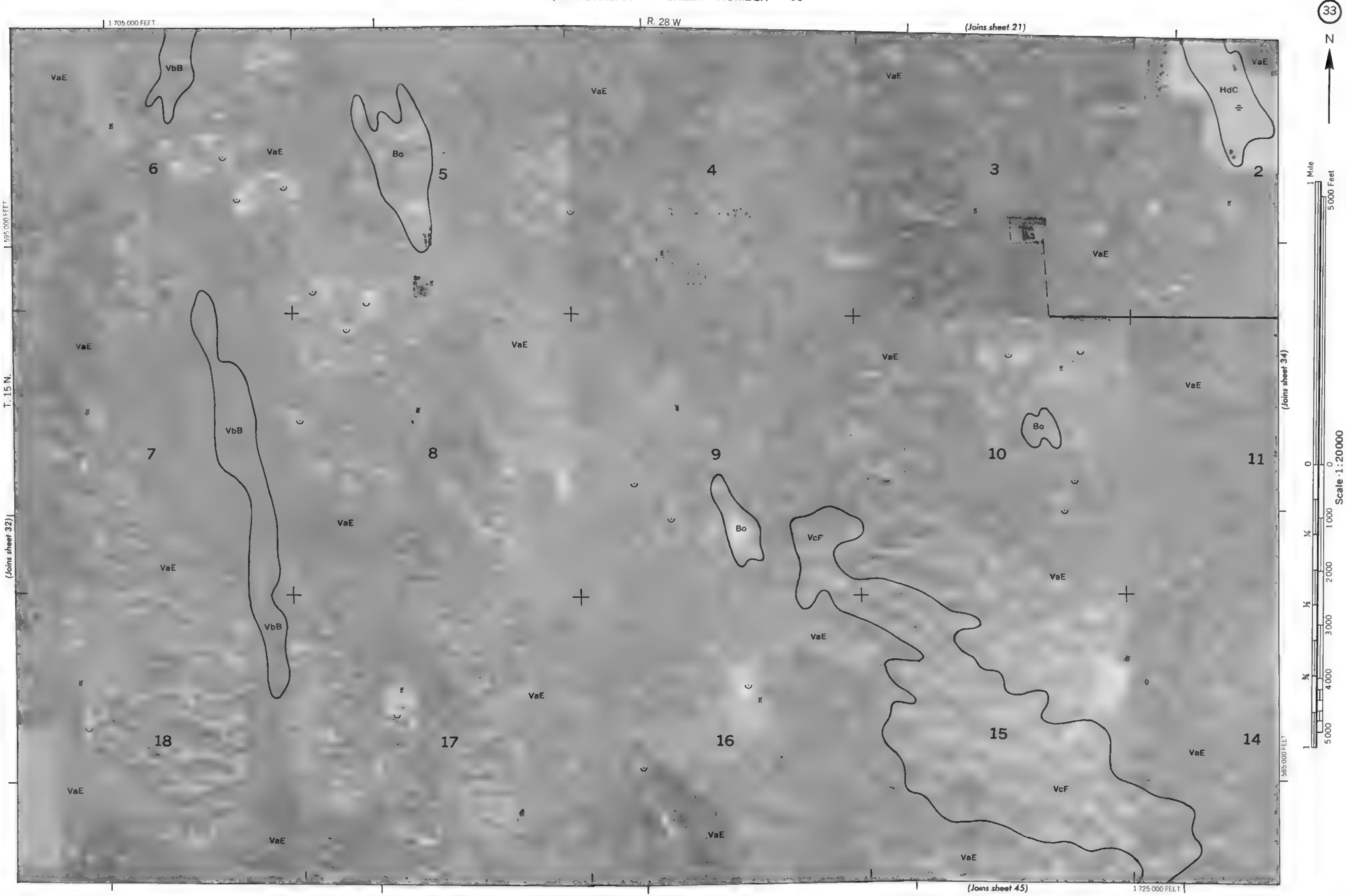
LINCOLN COUNTY, NEBRASKA NO. 31

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 32



LINCOLN COUNTY, NEBRASKA NO. 33

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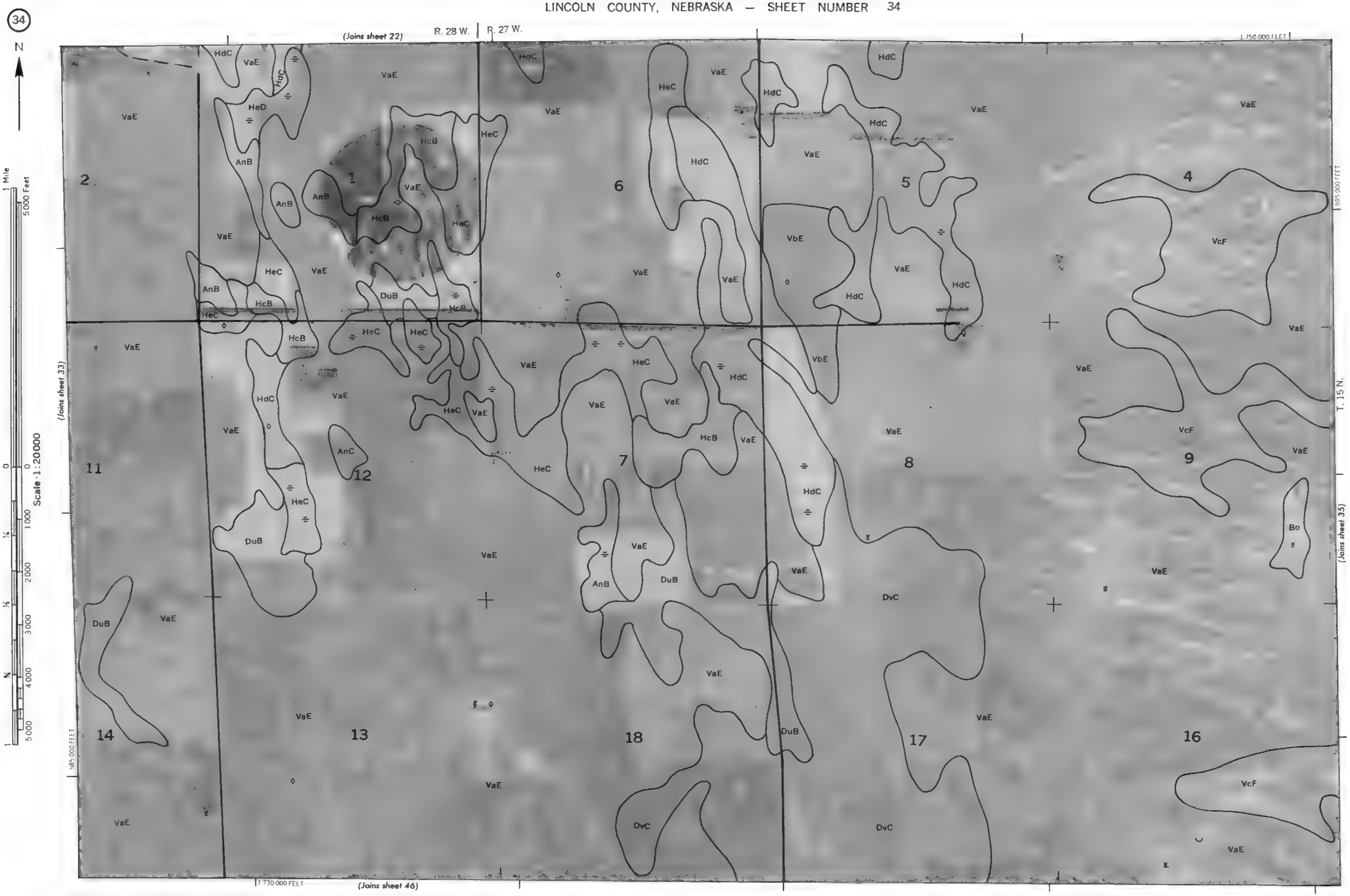

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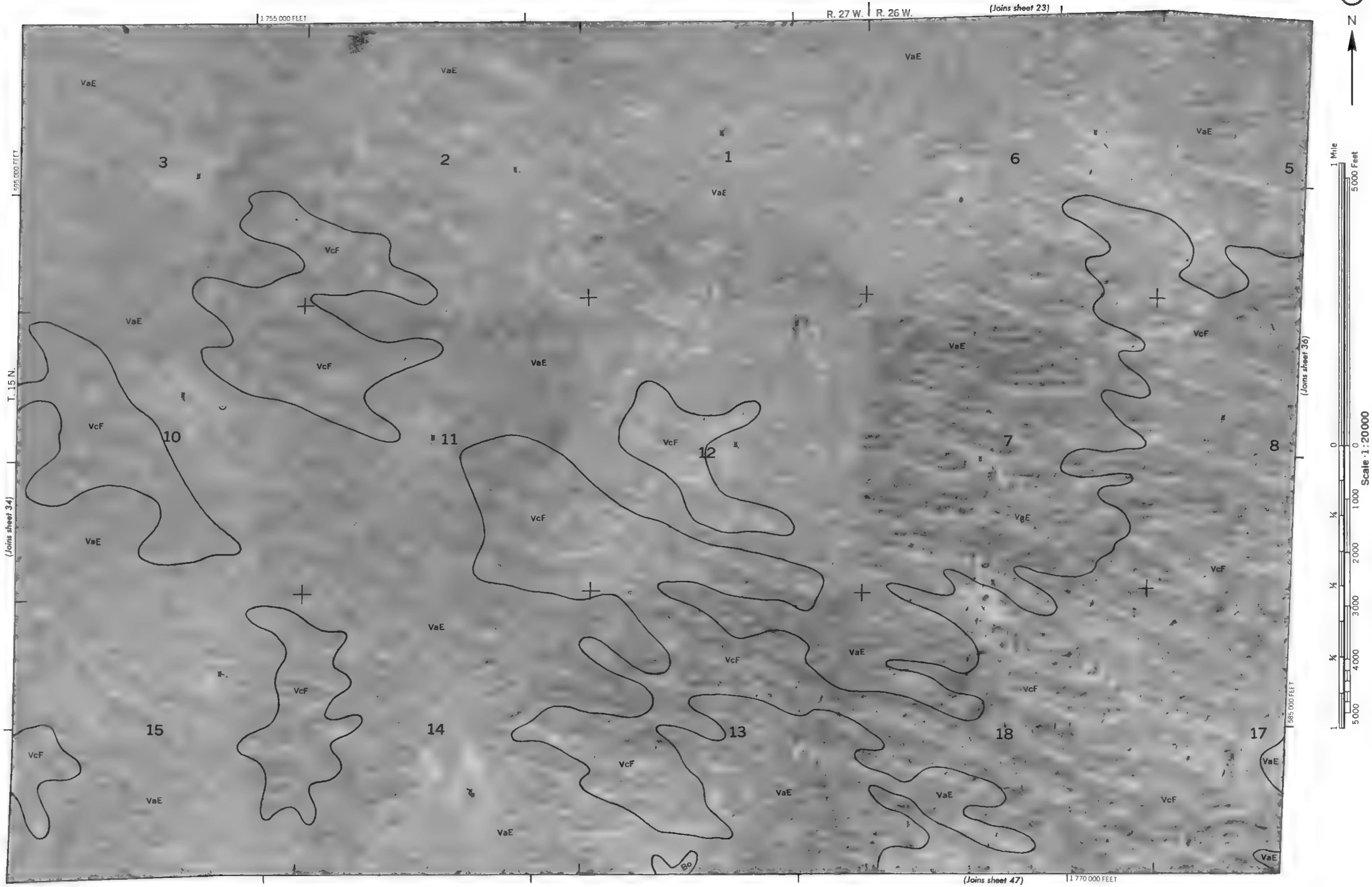

LINCOLN COUNTY, NEBRASKA NO. 35

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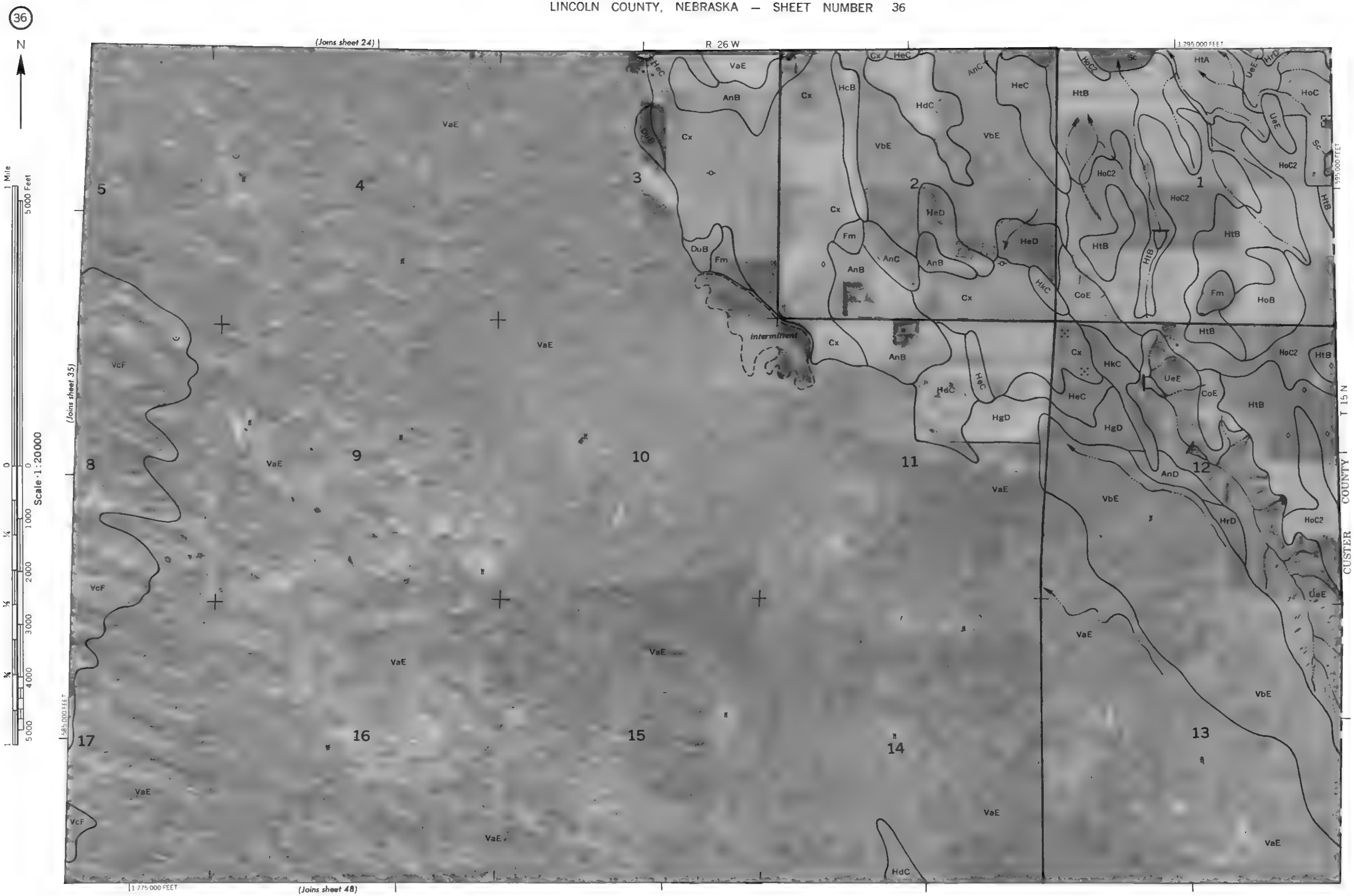

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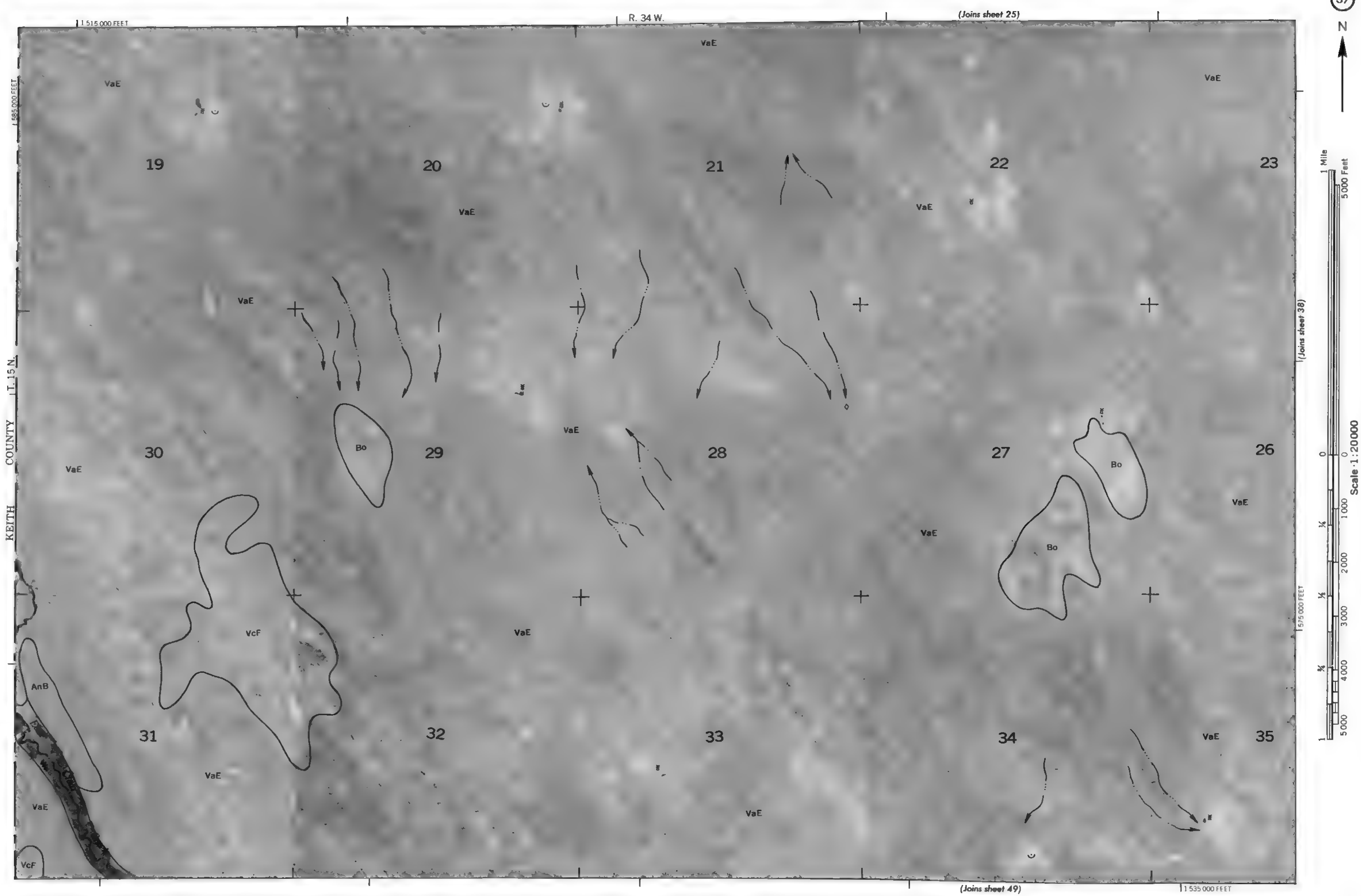
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

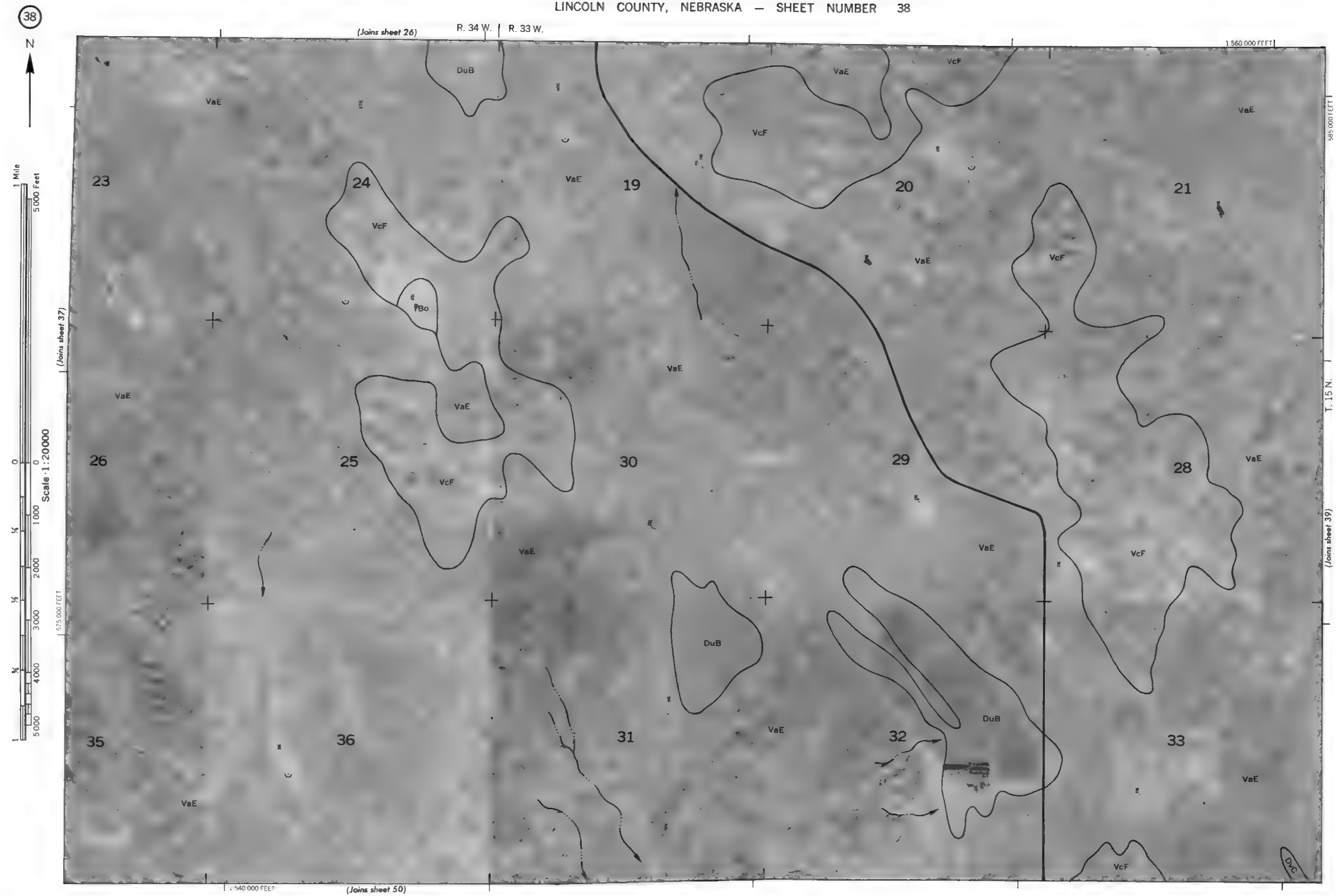
LINCOLN COUNTY, NEBRASKA NO. 36



LINCOLN COUNTY, NEBRASKA NO. 37

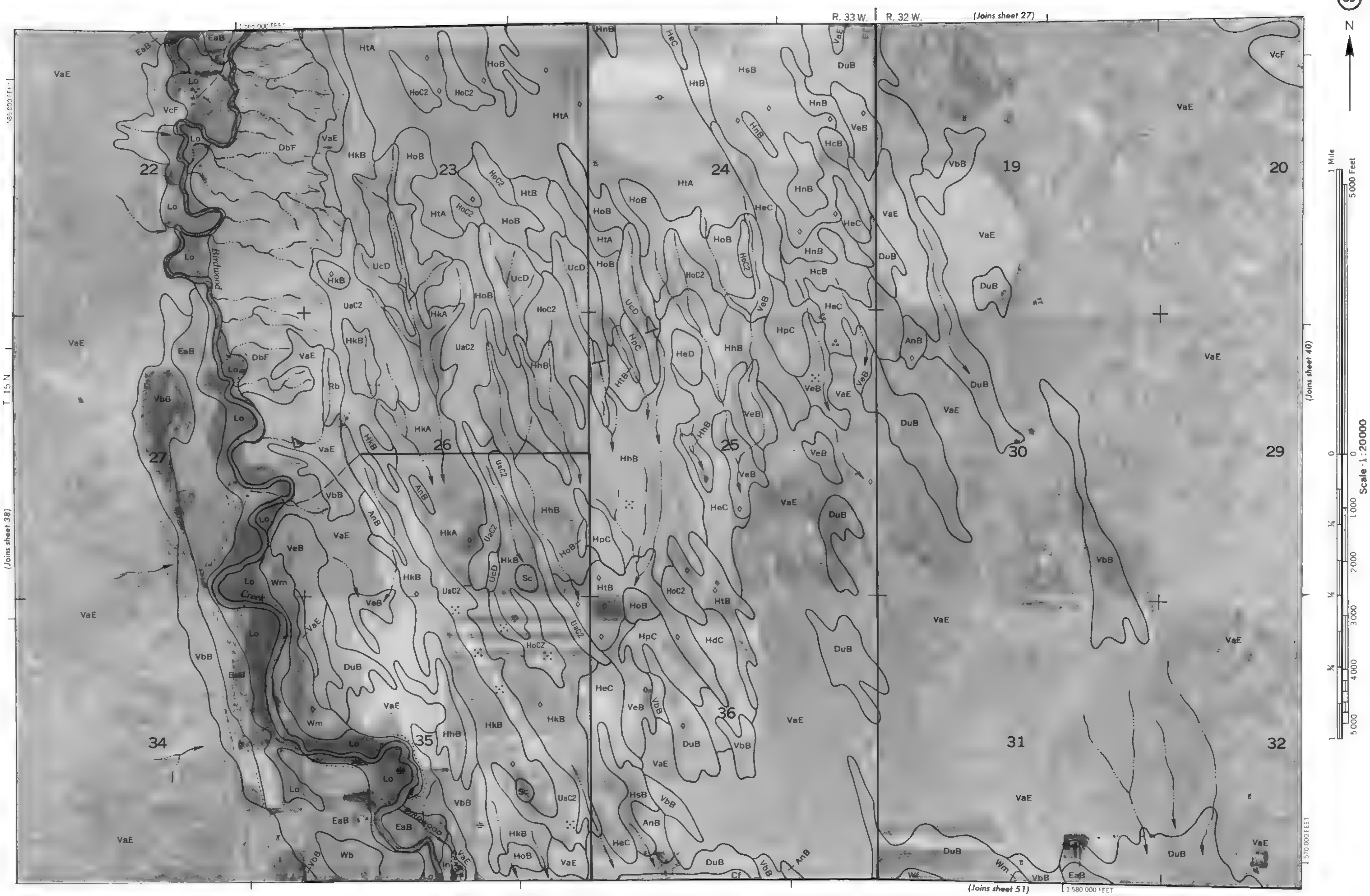
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 38



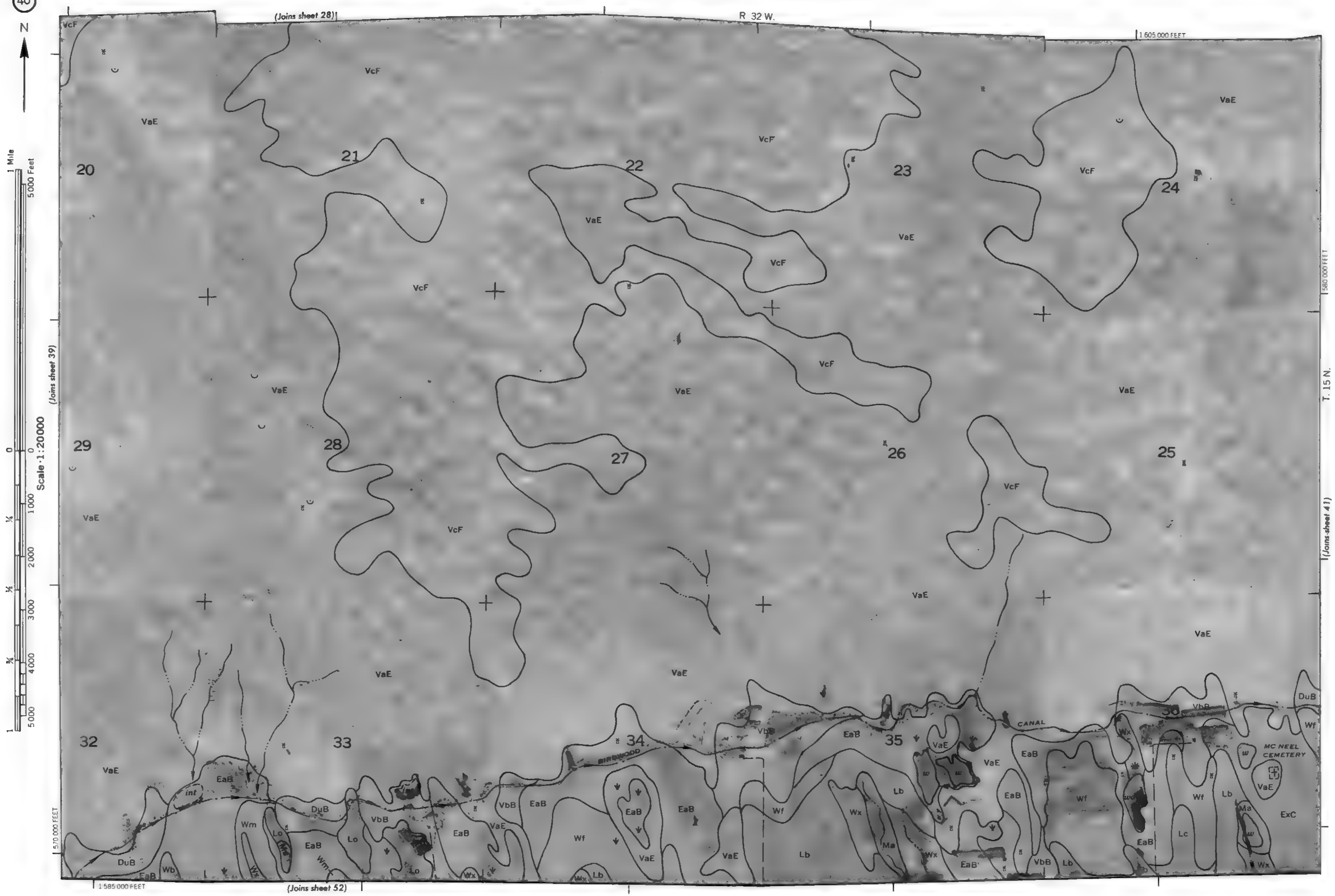
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 38

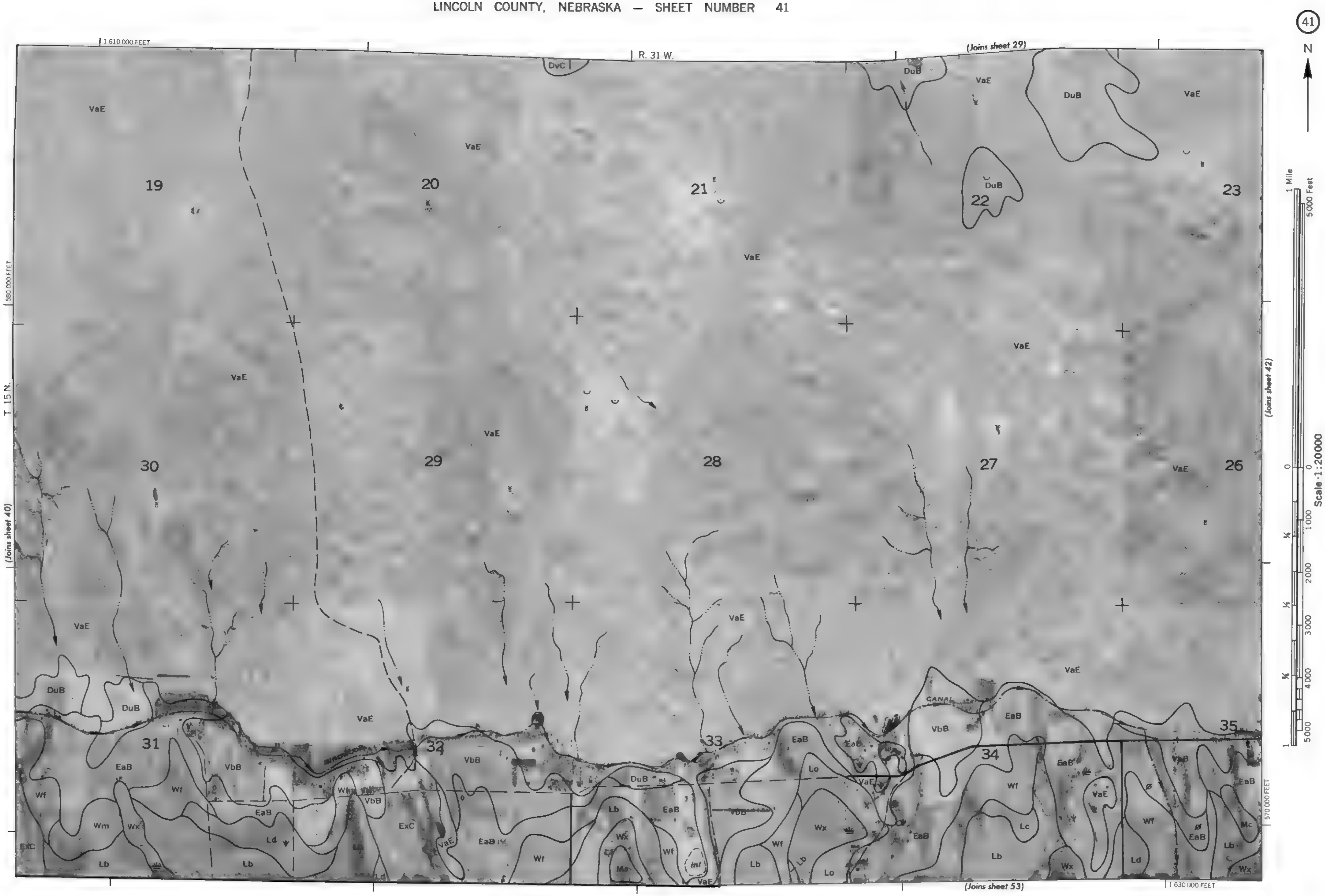


LINCOLN COUNTY, NEBRASKA NO. 39

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

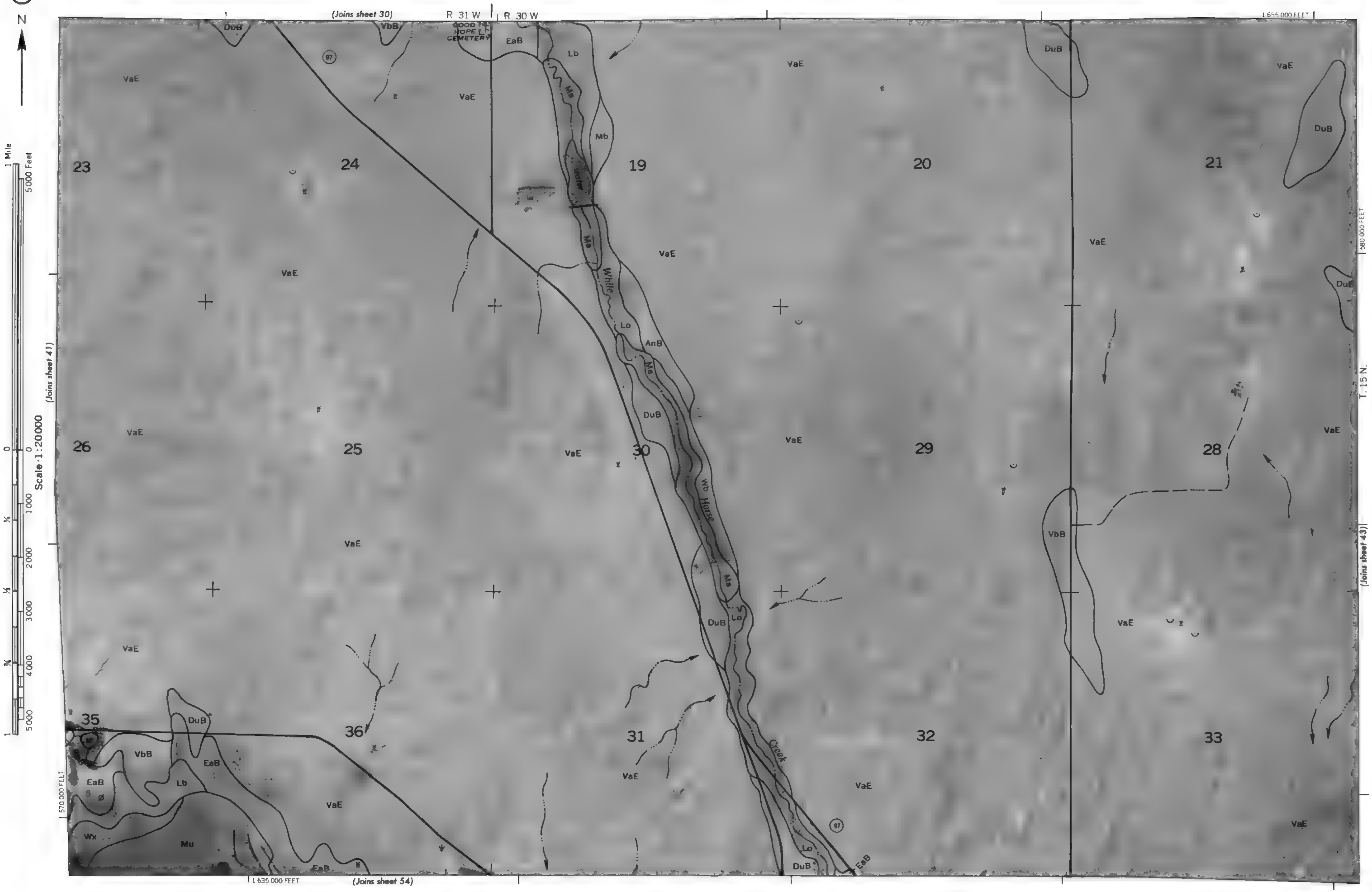


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

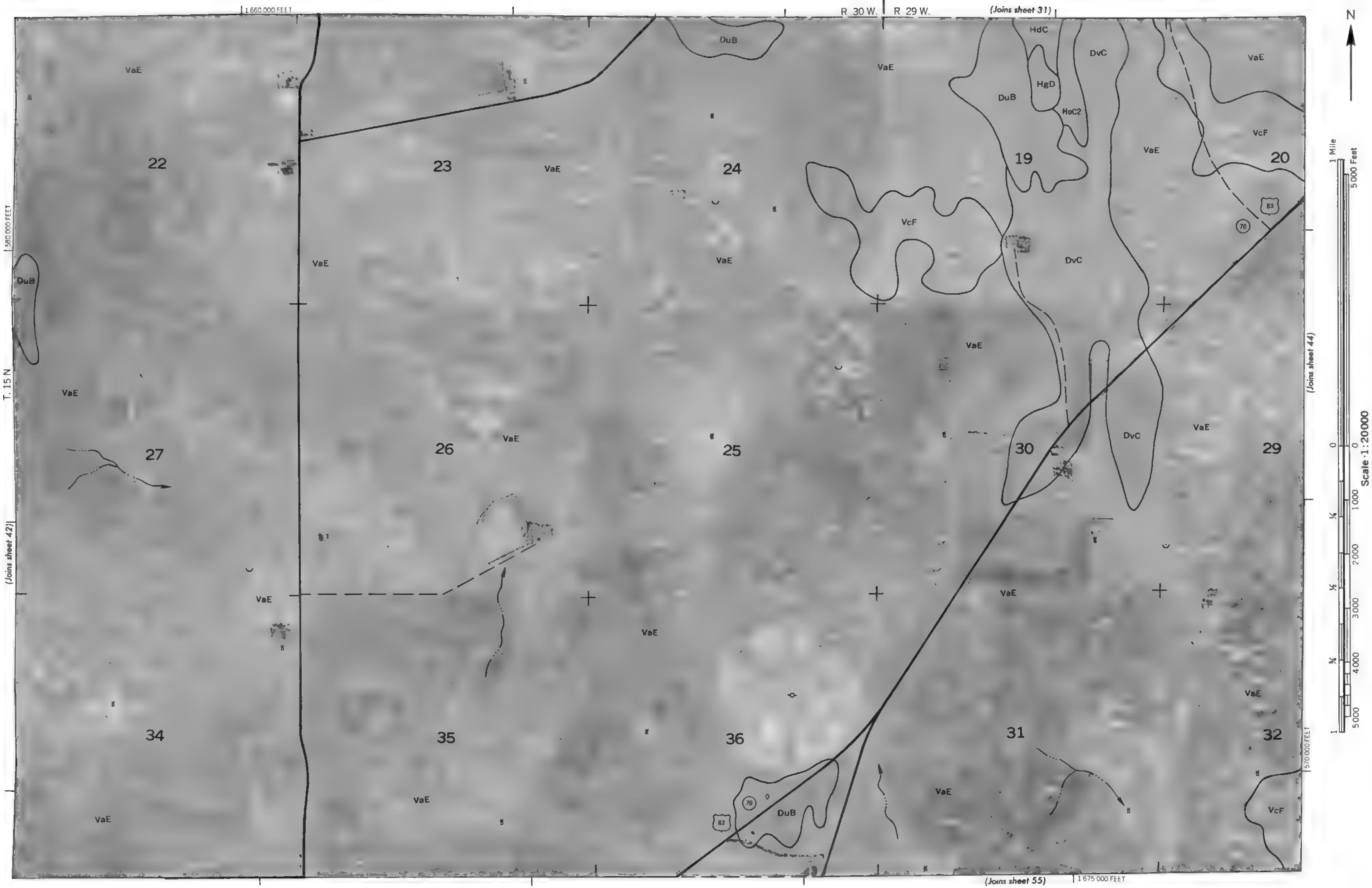


LINCOLN COUNTY, NEBRASKA NO. 41

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



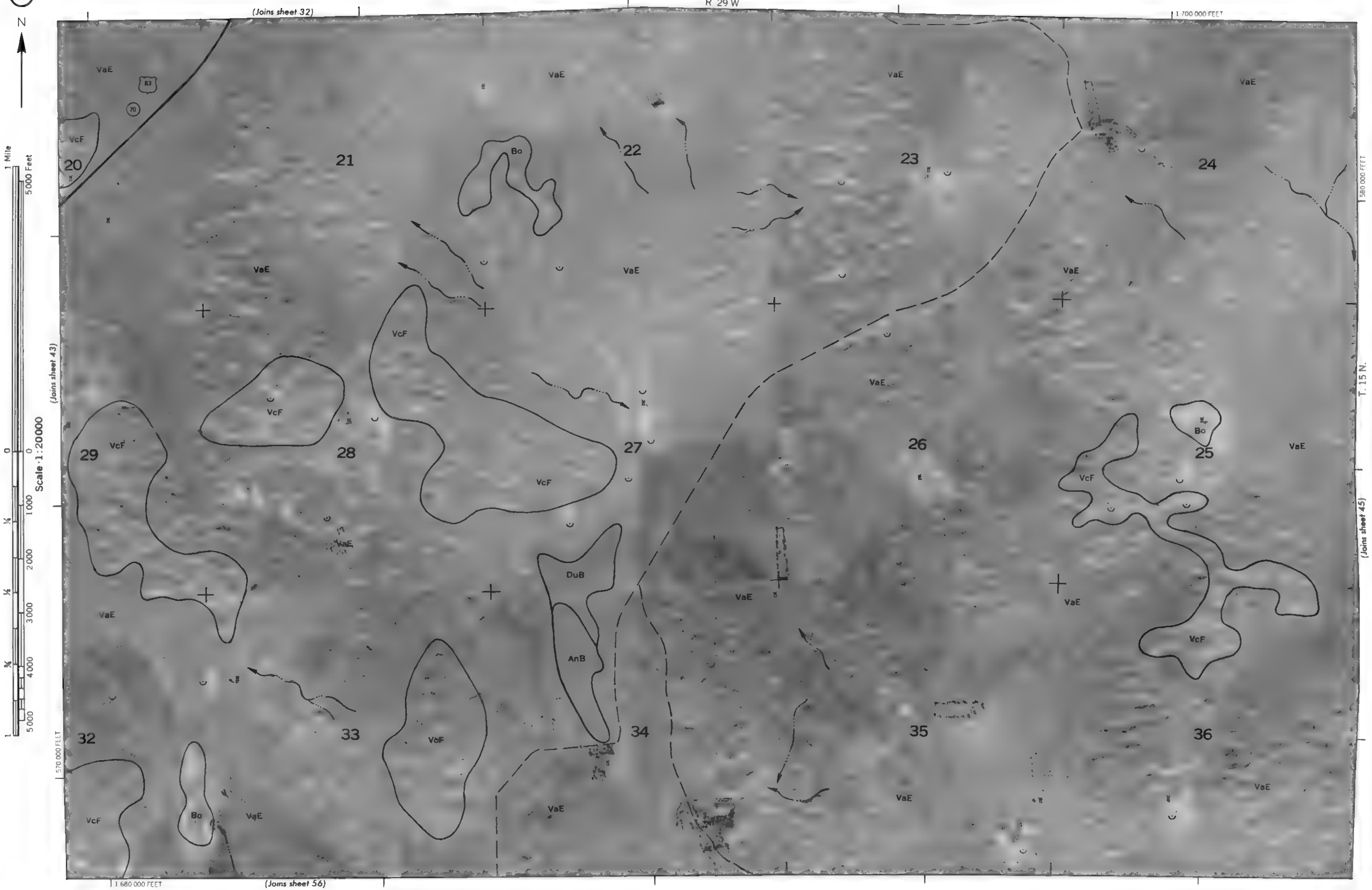
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned



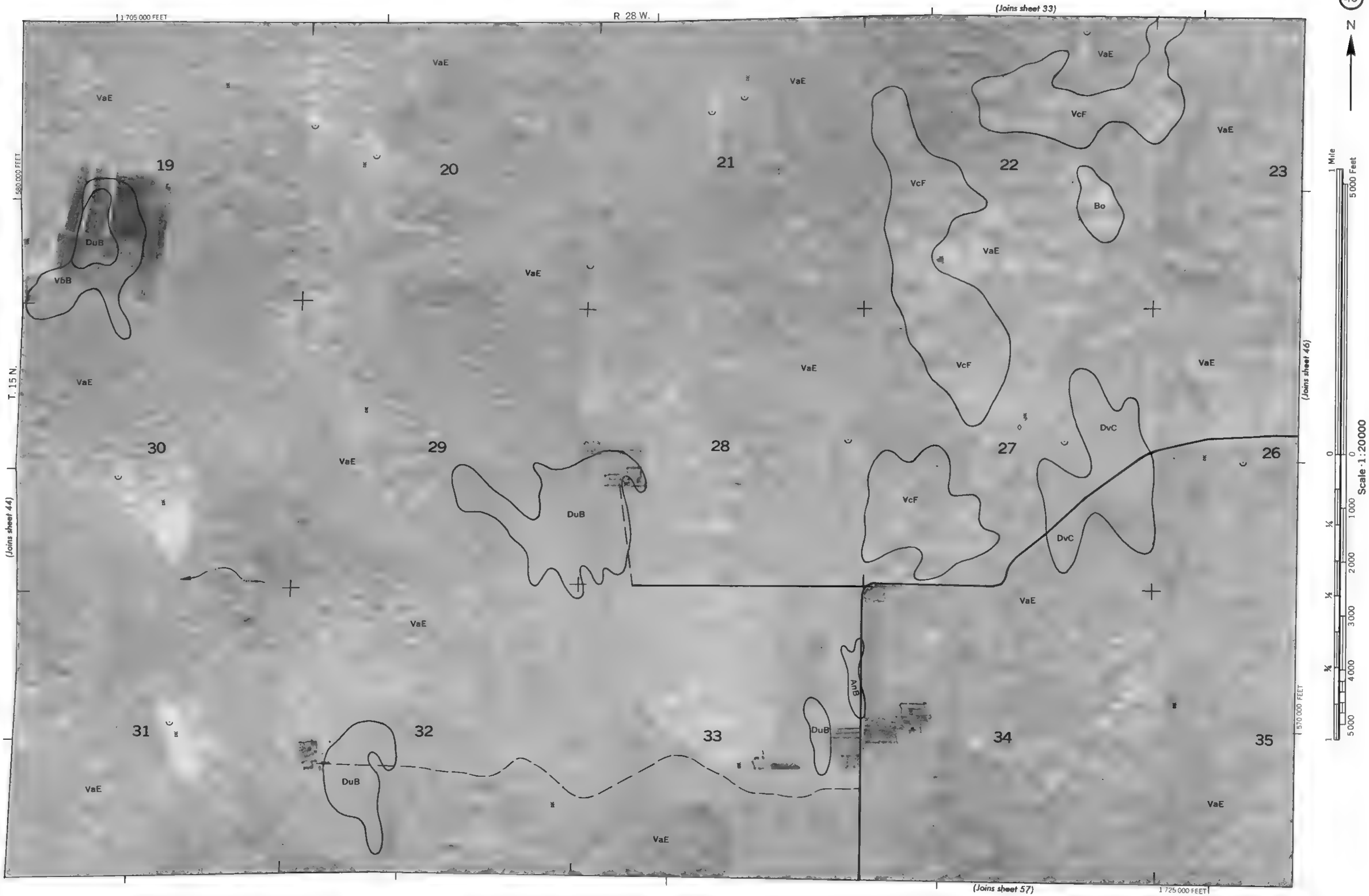
LINCOLN COUNTY, NEBRASKA NO. 43

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 44

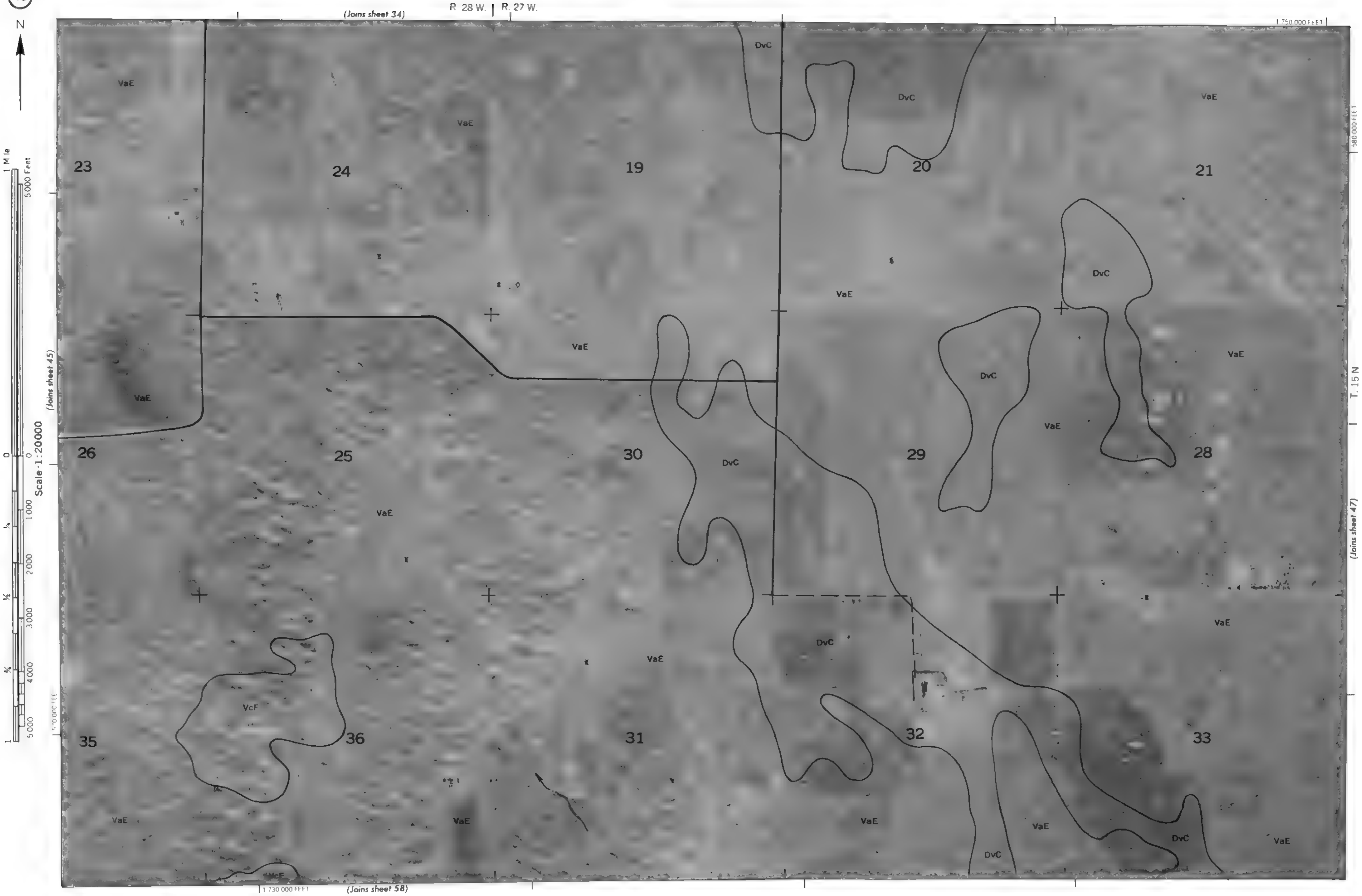


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

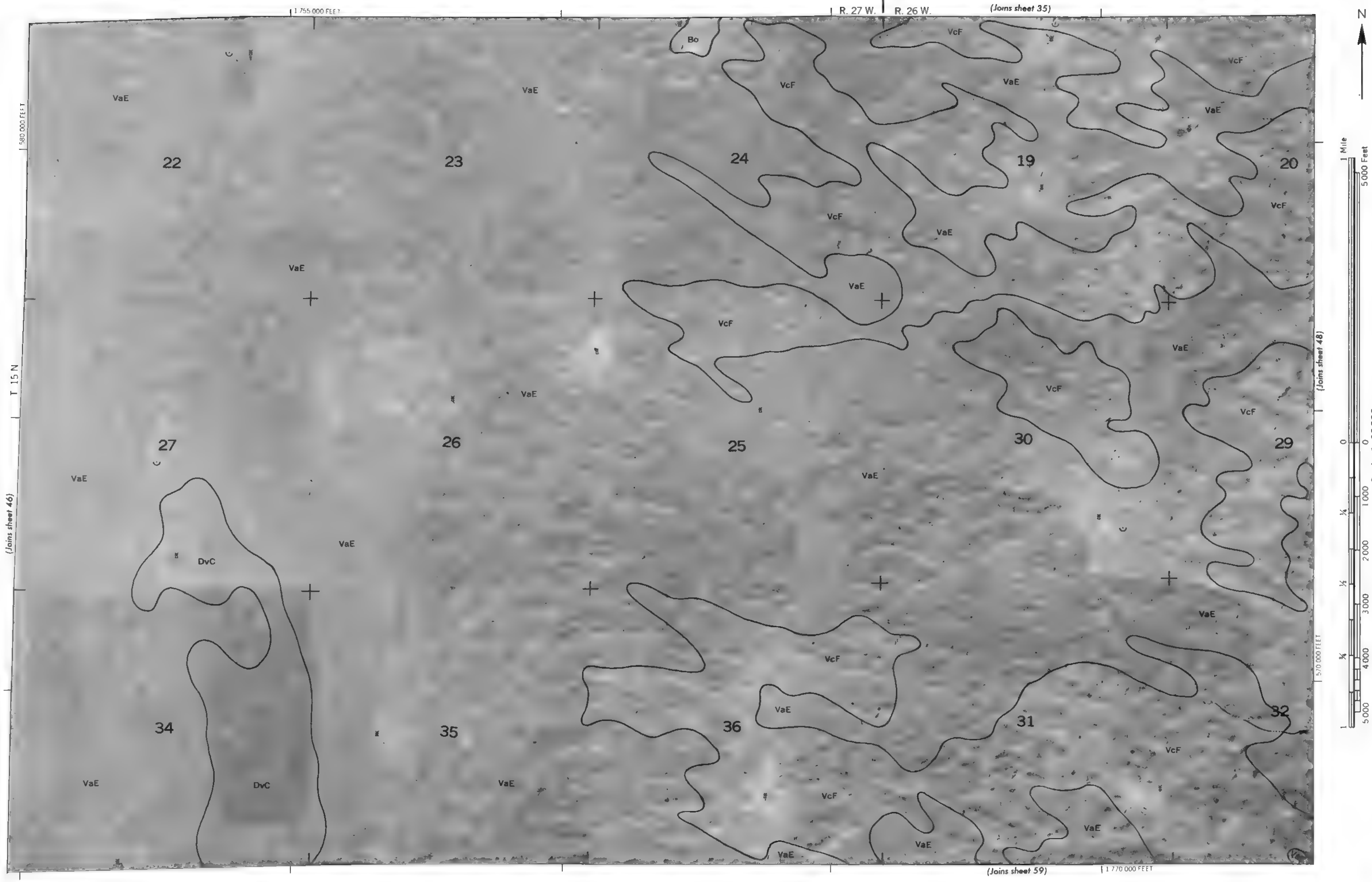


LINCOLN COUNTY, NEBRASKA NO. 45

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

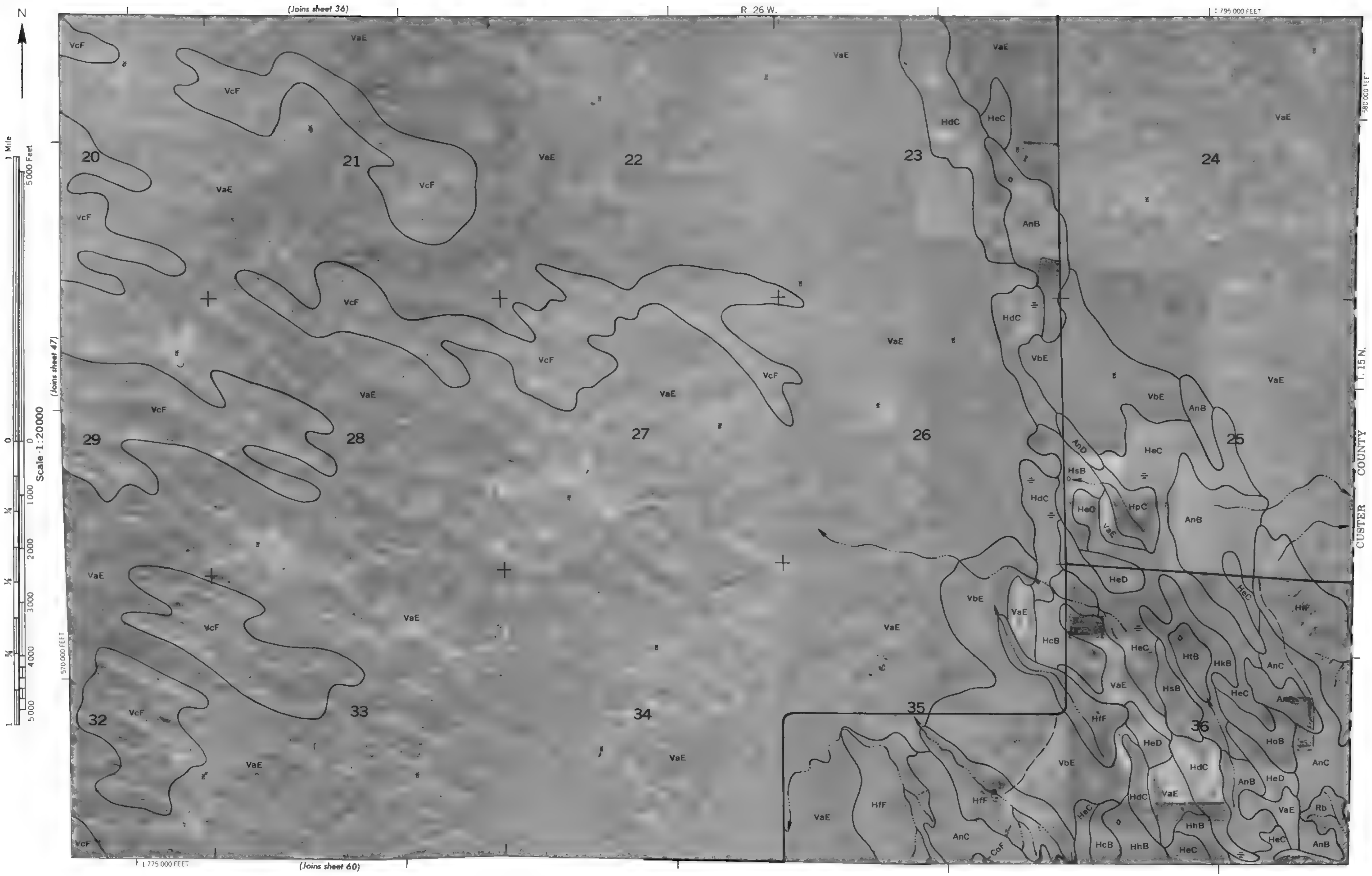


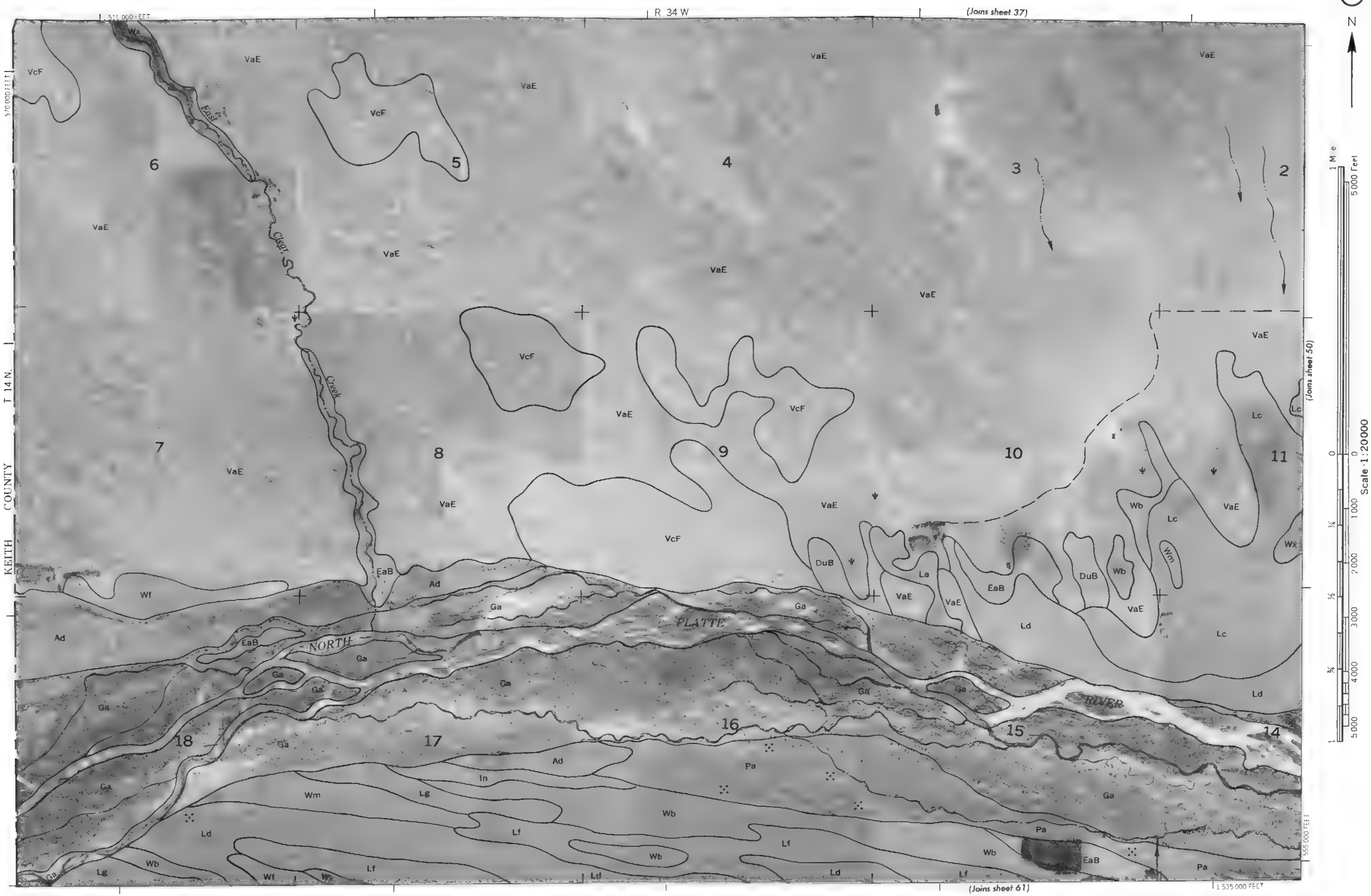
LINCOLN COUNTY, NEBRASKA NO. 46



LINCOLN COUNTY, NEBRASKA NO. 47

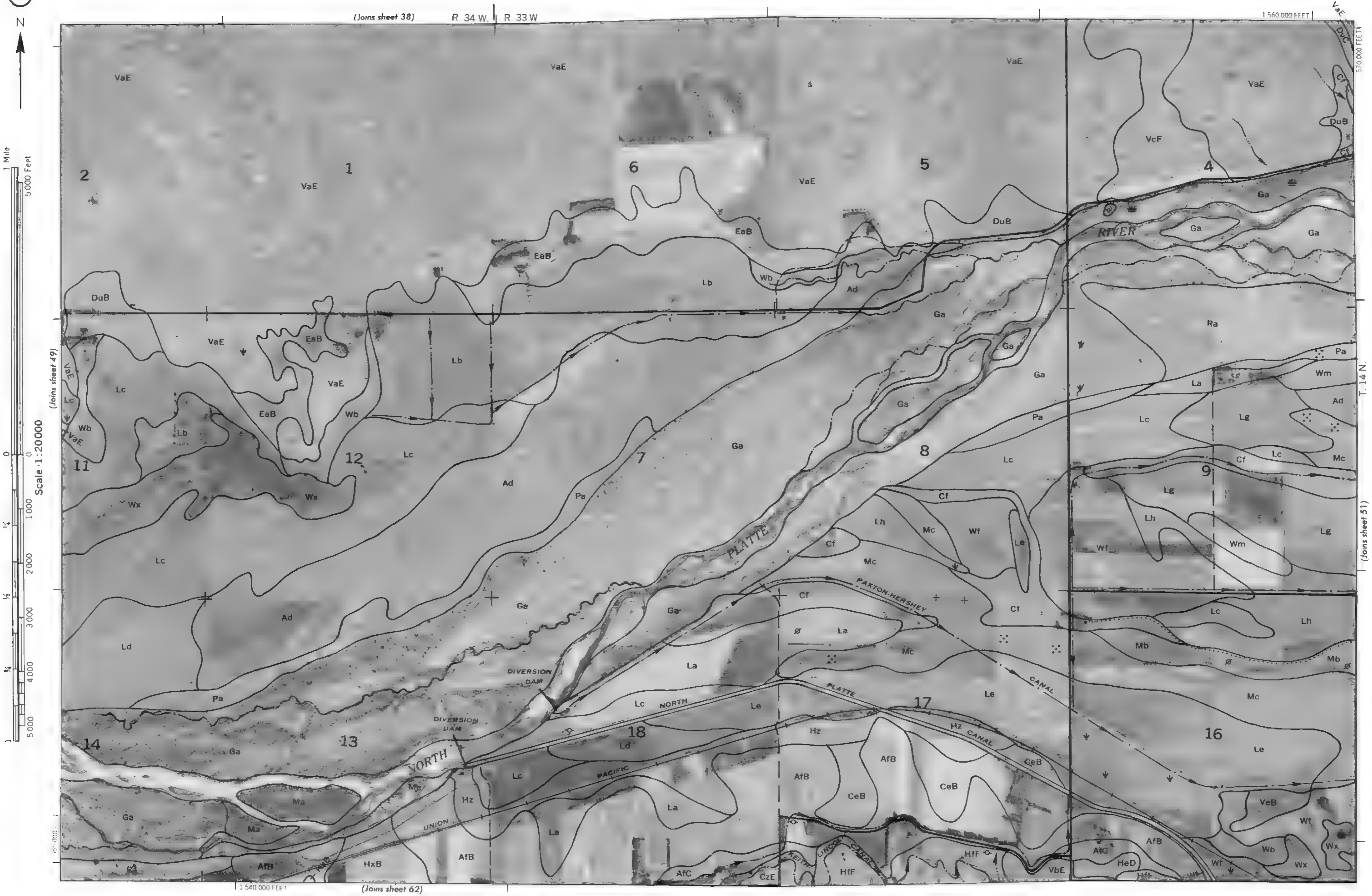
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 36)
R. 26 W.
1 795 000 FEET
580 000 FEET
T. 15 N.
CUSTER COUNTY
(Joins sheet 47)
(Joins sheet 60)
1 775 000 FEET
570 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
VaE
VcF
VbE
HdC
HeC
HeD
AnB
AnC
AnD
HsB
HpC
HcB
HtB
HkB
HoB
HfF
HhB
CoF
Rb



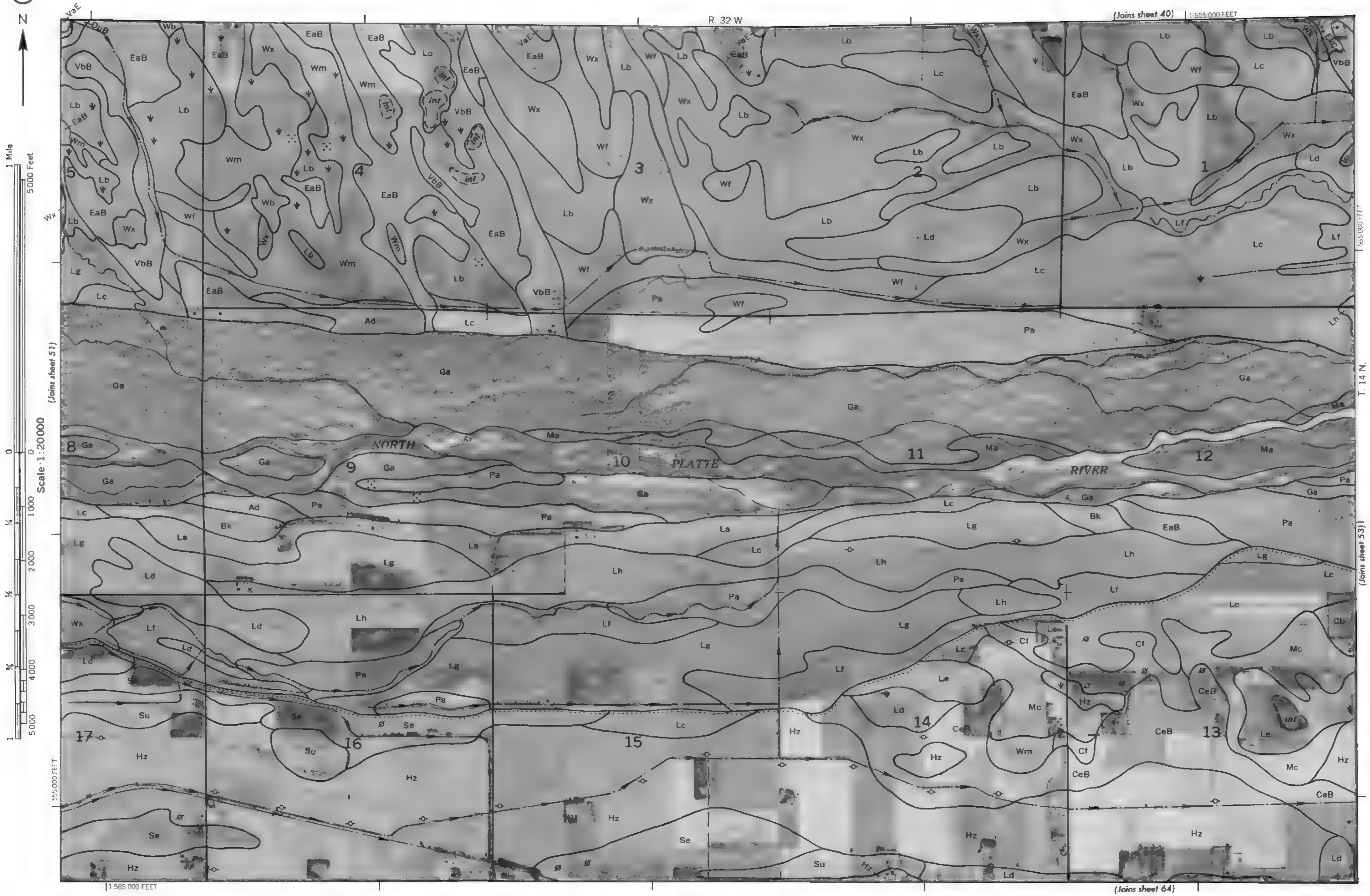
LINCOLN COUNTY, NEBRASKA NO. 49

This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

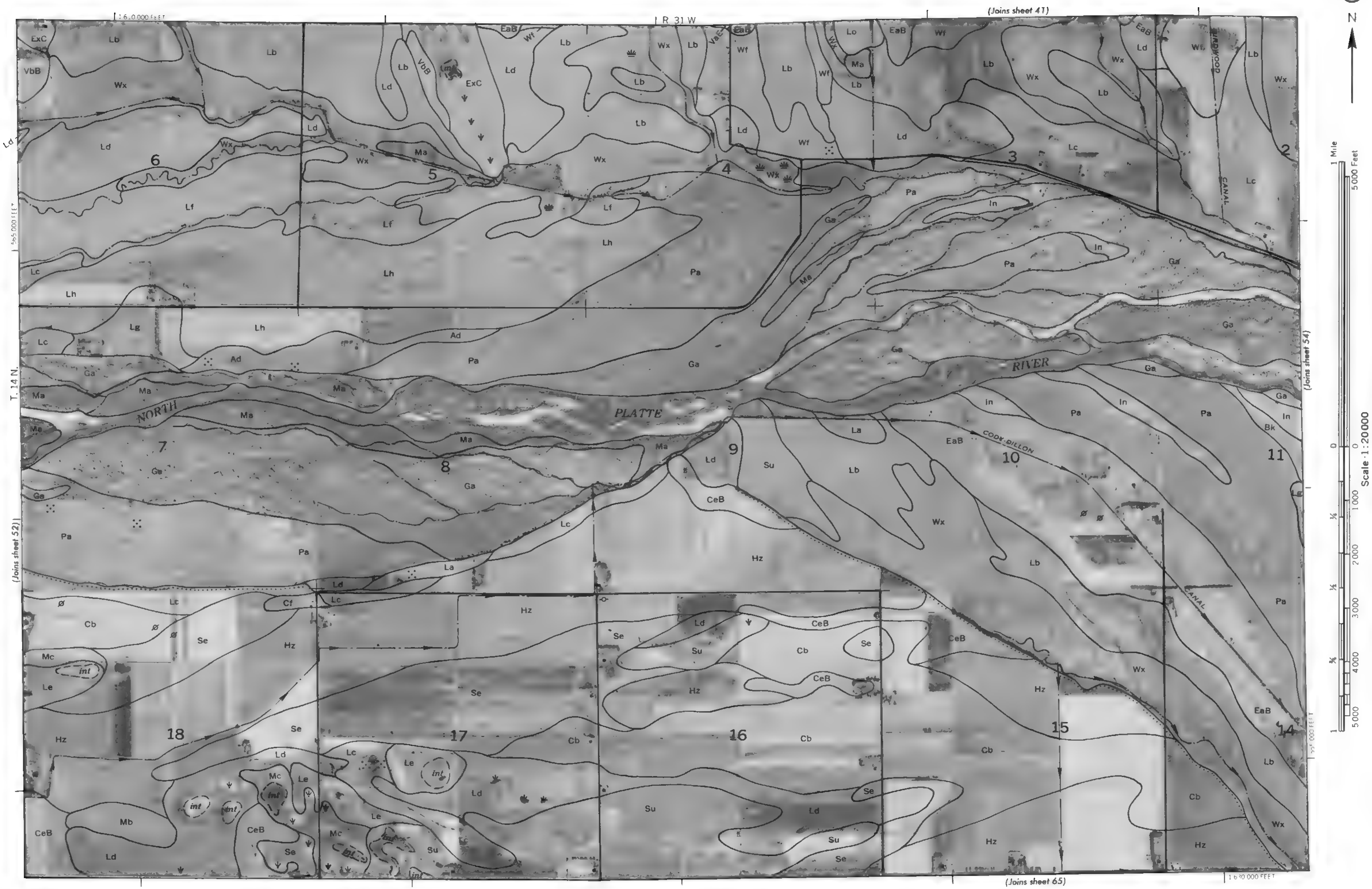

50
N
(Joins sheet 38)
R 34 W.
R 33 W
1 560 000 FEET
570 000 FEET
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 62)
1 540 000 FEET
T. 14 N.
1 Mile
5000 Feet
Scale 1:20000
PLATTE
RIVER
NORTH
DIVERSION DAM
PAXTON-HERSHEY CANAL
NORTH PLATTE CANAL
UNION PACIFIC
KEITH LINCOLN CANAL
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18
VaE
VcF
DuB
EaB
Lb
Wb
Ad
Ga
Ra
Pa
La
Lc
Lg
Wm
Mc
Cf
Lh
Wf
Le
Wx
Ld
Mb
Ma
Hz
AfB
CeB
HxB
AfC
CzE
HfF
VbE
HeD
VeB

LINCOLN COUNTY, NEBRASKA NO. 51

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

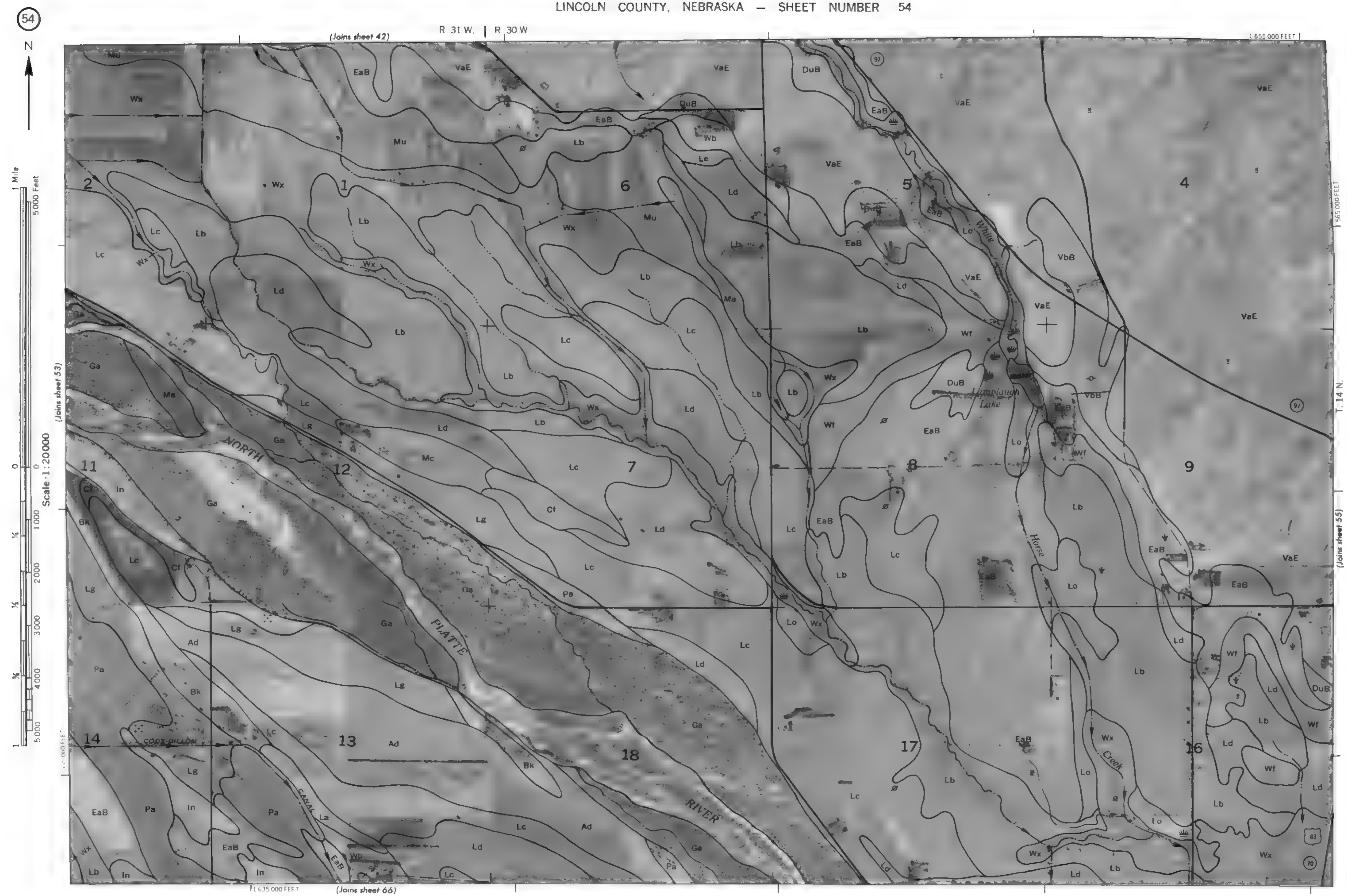


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



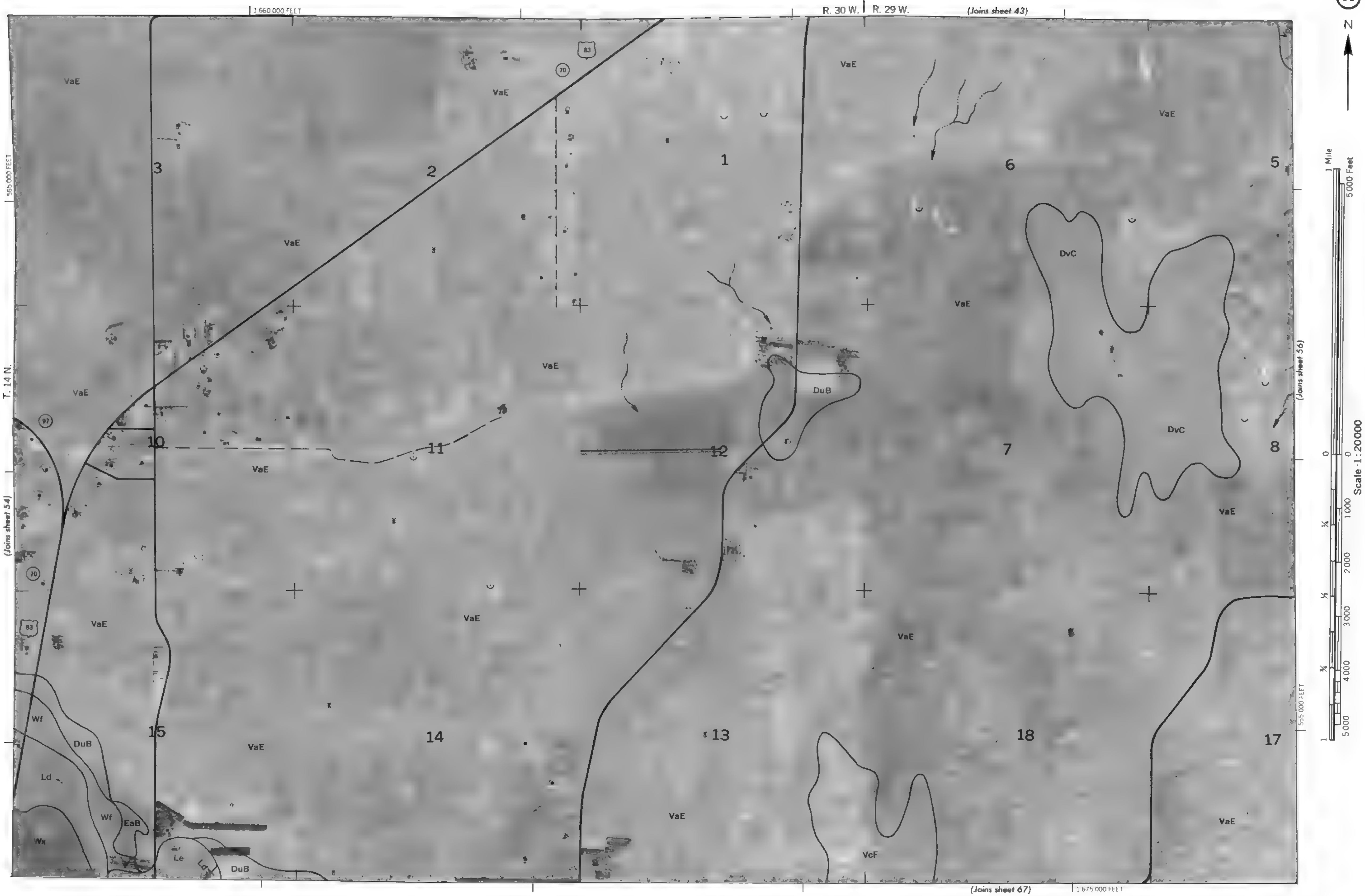
LINCOLN COUNTY, NEBRASKA NO. 53

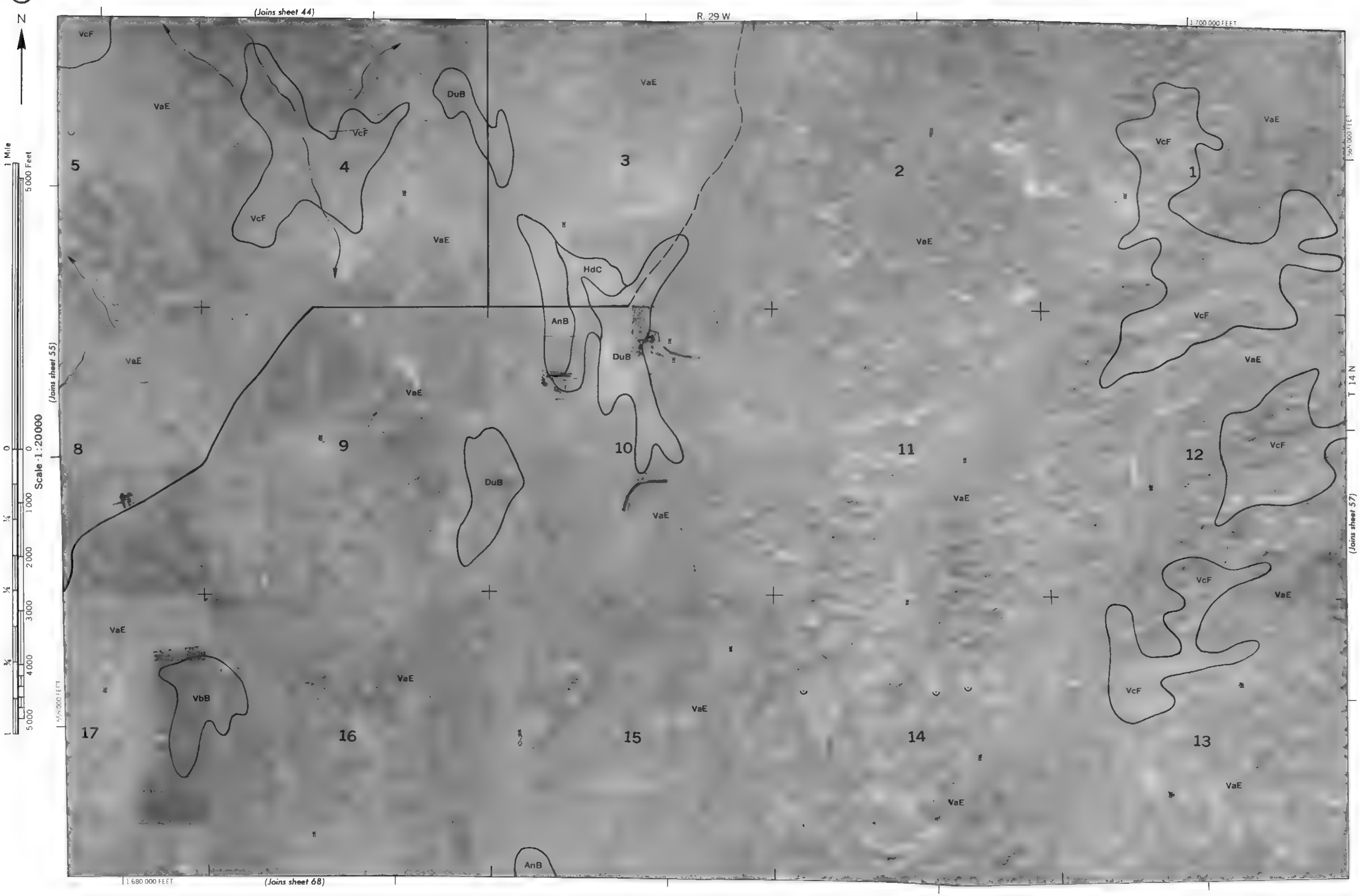
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

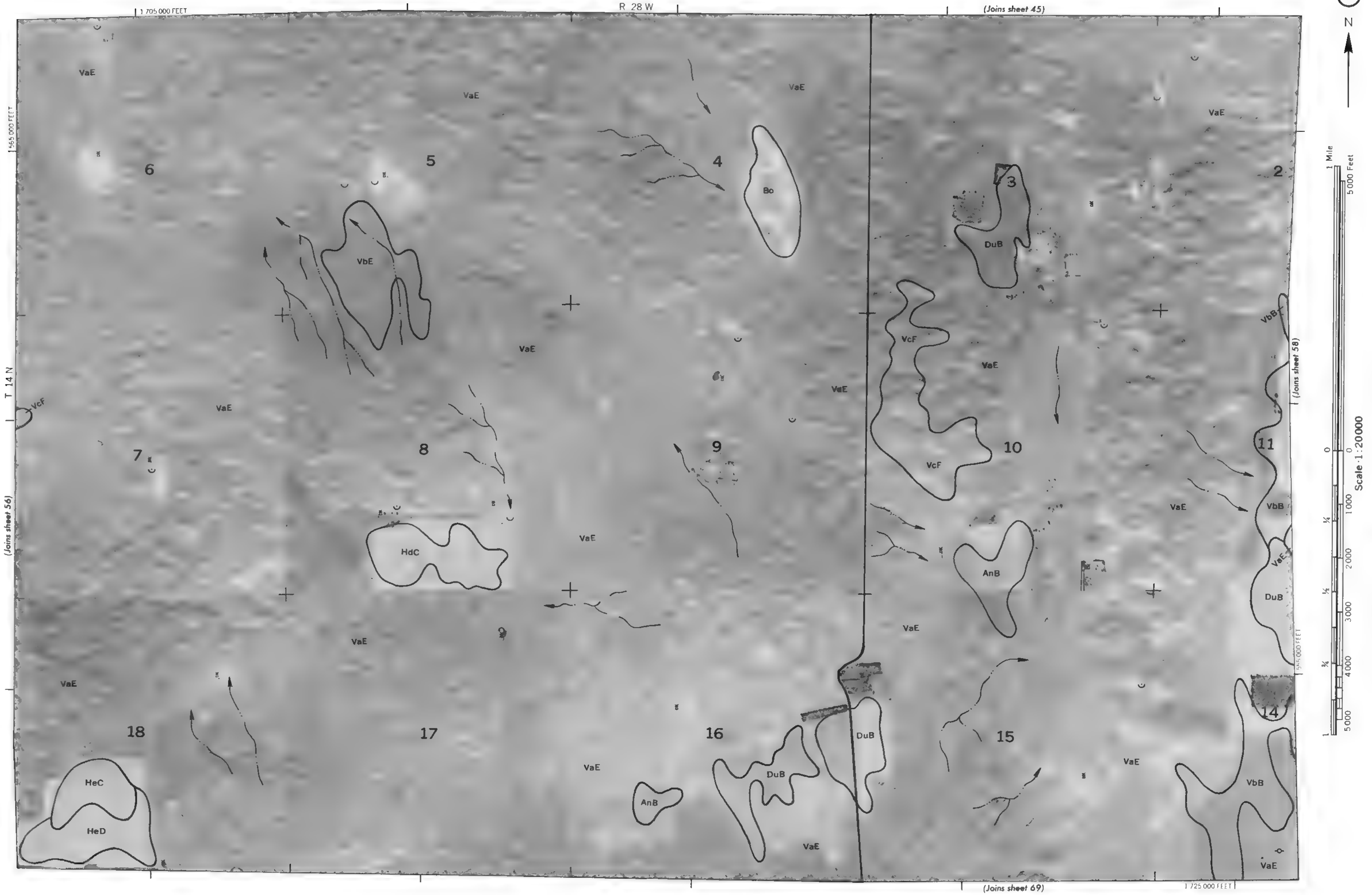
LINCOLN COUNTY, NEBRASKA NO. 54


55
N
1 660 000 FEET
R. 30 W. | R. 29 W.
(Joins sheet 43)
(Joins sheet 54)
(Joins sheet 56)
(Joins sheet 67)
1 675 000 FEET
565 000 FEET
555 000 FEET
T. 14 N.
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
VaE
DvC
DvC
DuB
DuB
DuB
VcF
Wf
Wf
Ld
Ld
Wx
EaB
Le
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
83
70
97
1 Mile
5000 Feet
Scale 1:20000



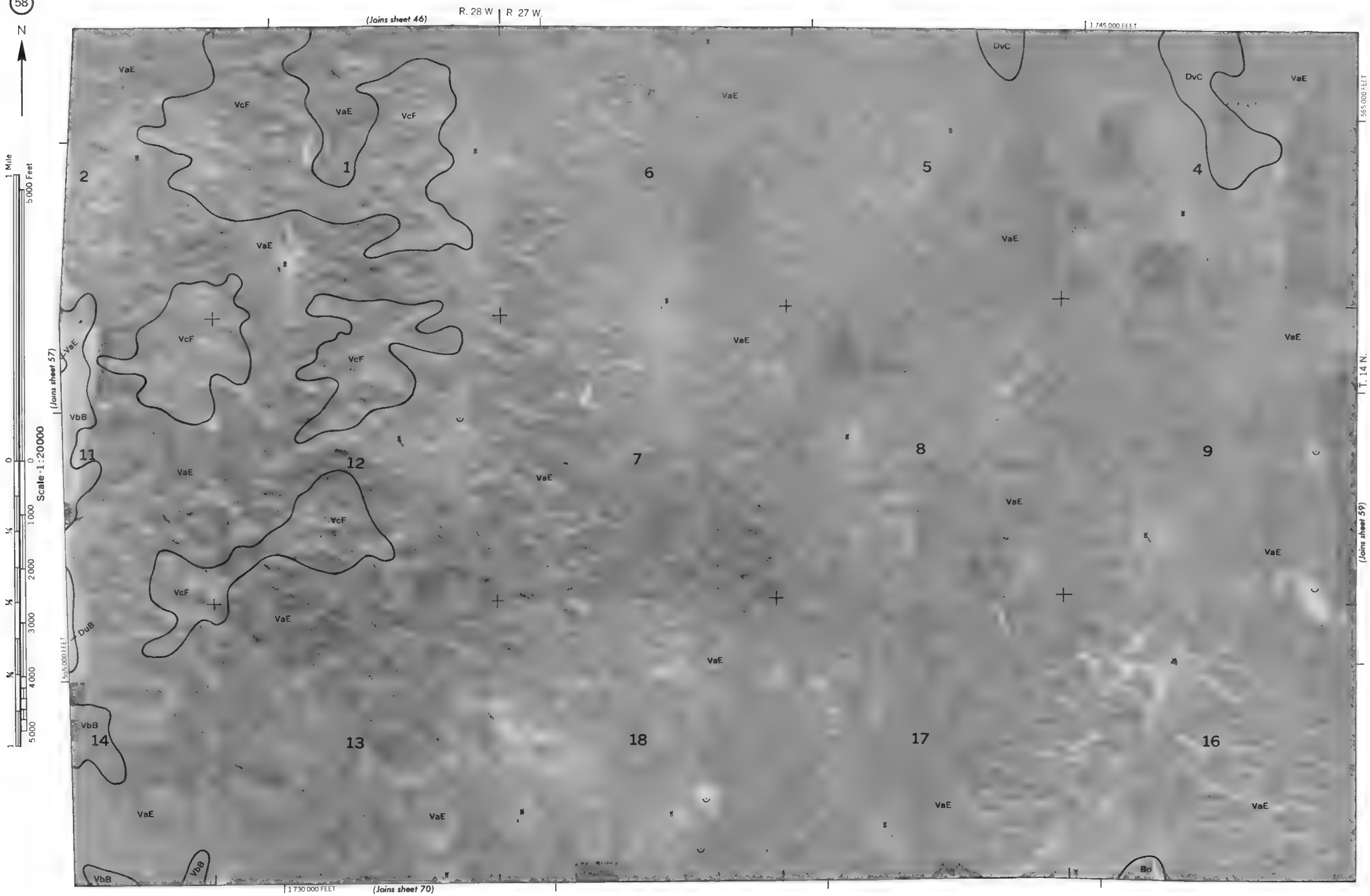
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 56



LINCOLN COUNTY, NEBRASKA NO. 57

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

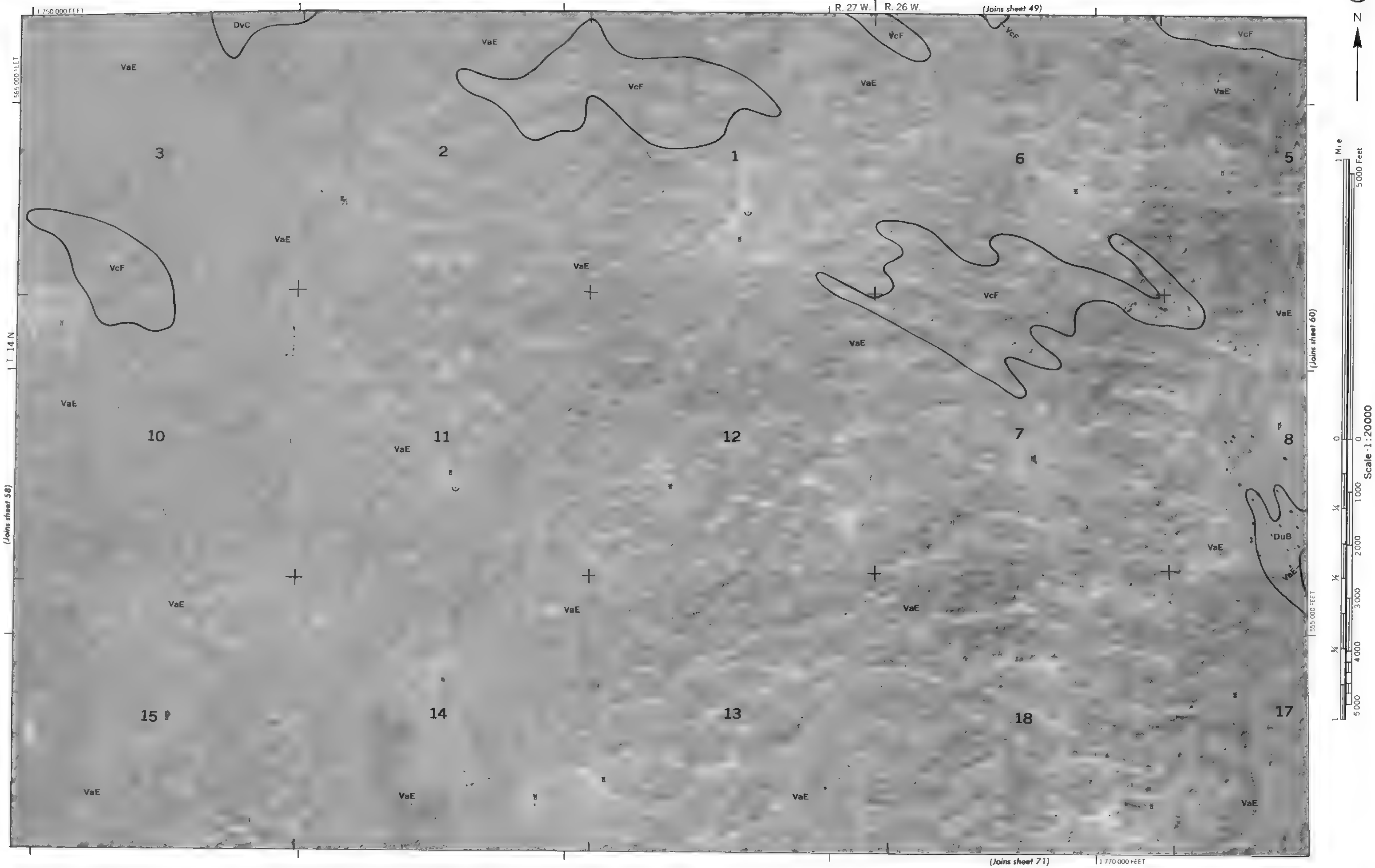


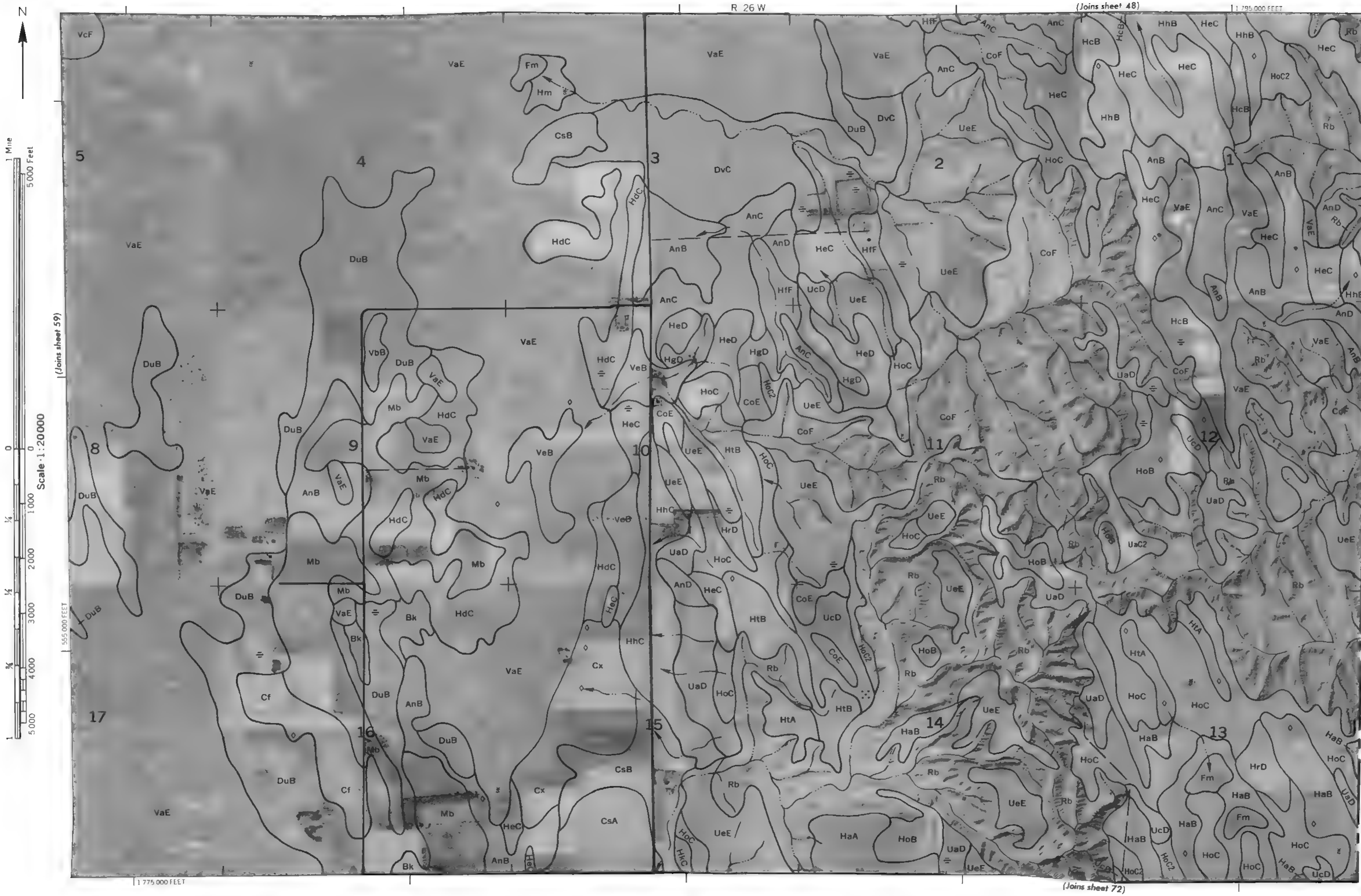
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(59)

LINCOLN COUNTY, NEBRASKA NO. 59

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



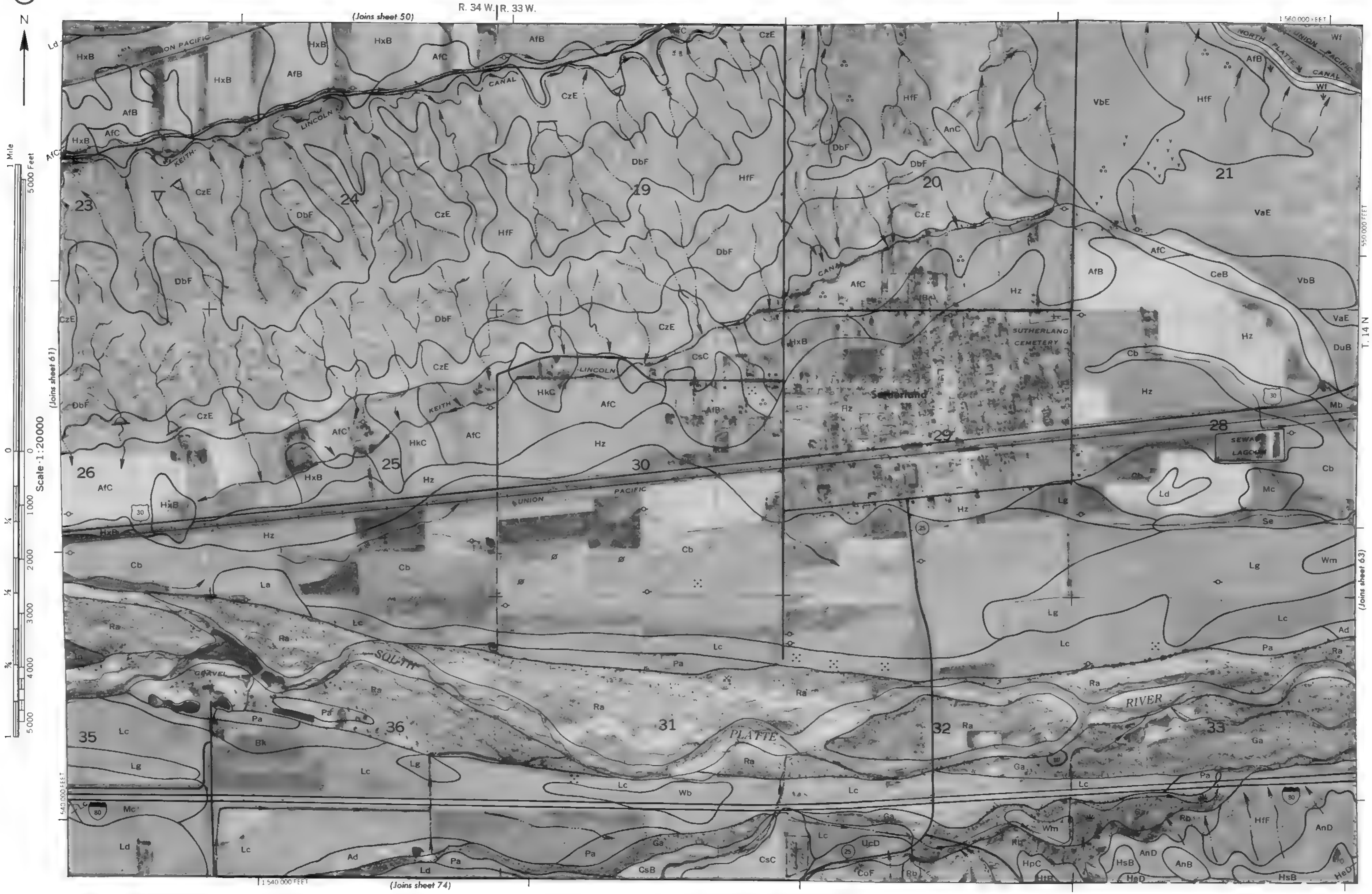


This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 60

LINCOLN COUNTY, NEBRASKA NO. 61

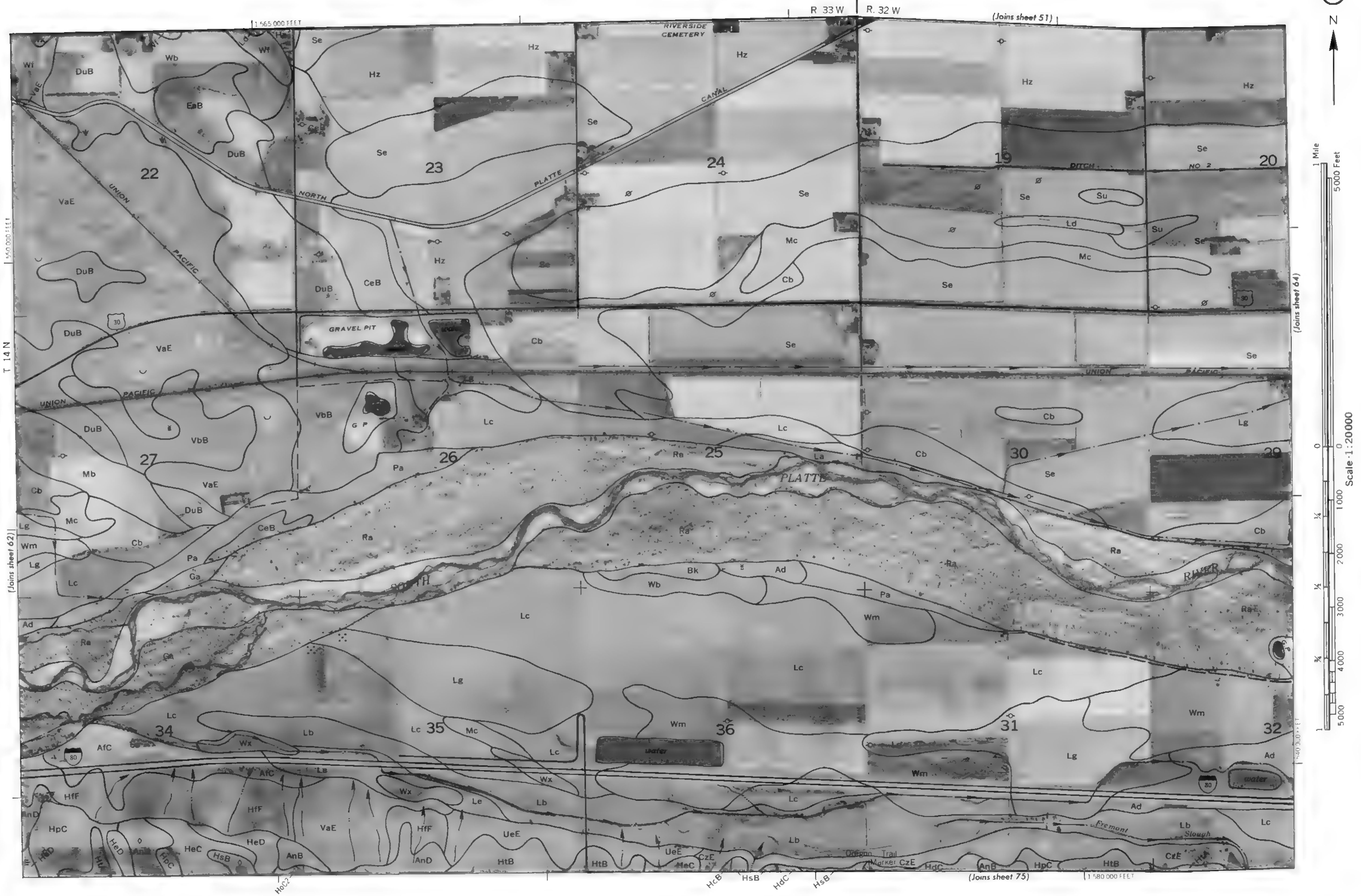
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



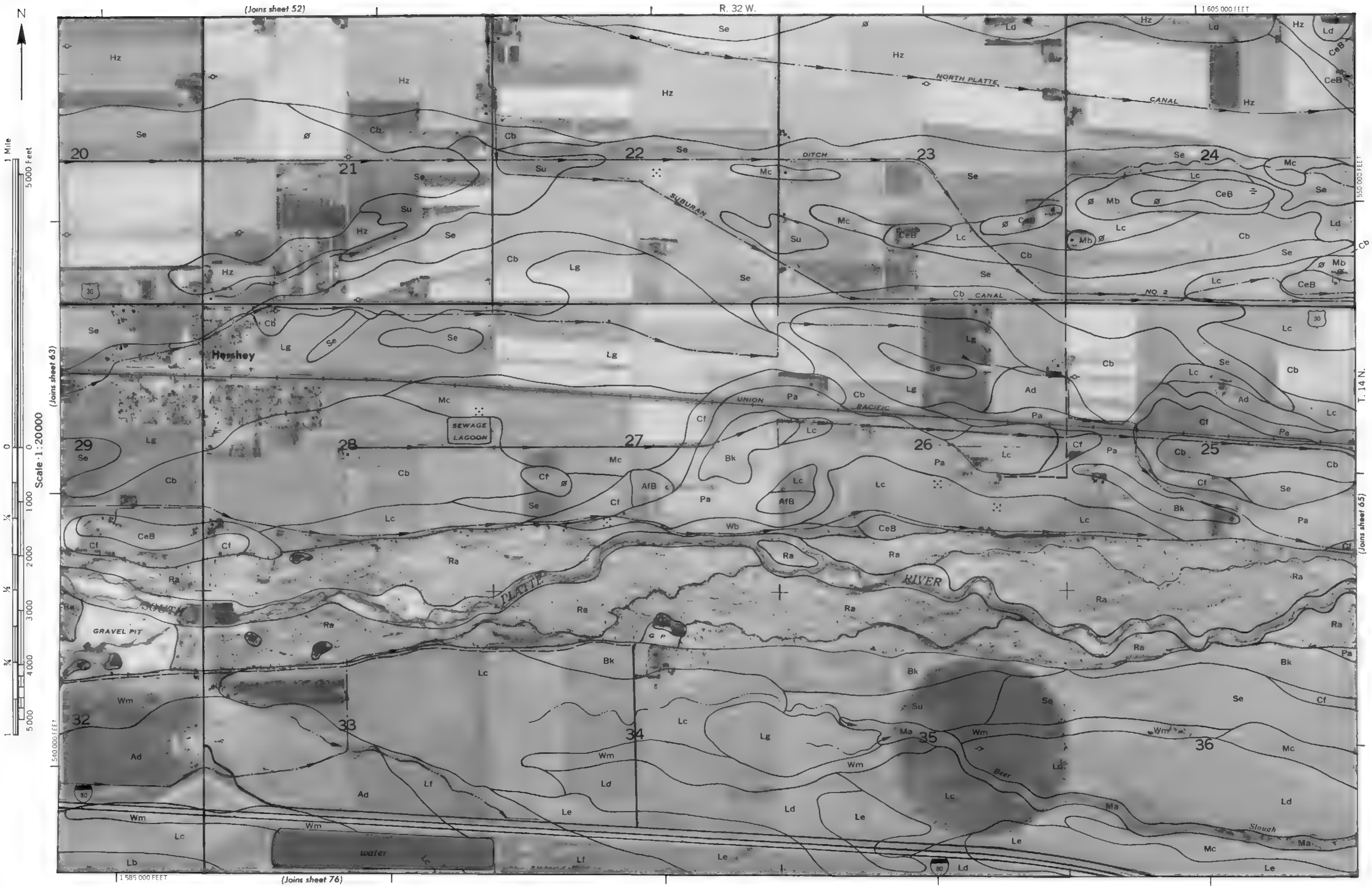
This map is compiled on 19[illegible]4 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 62

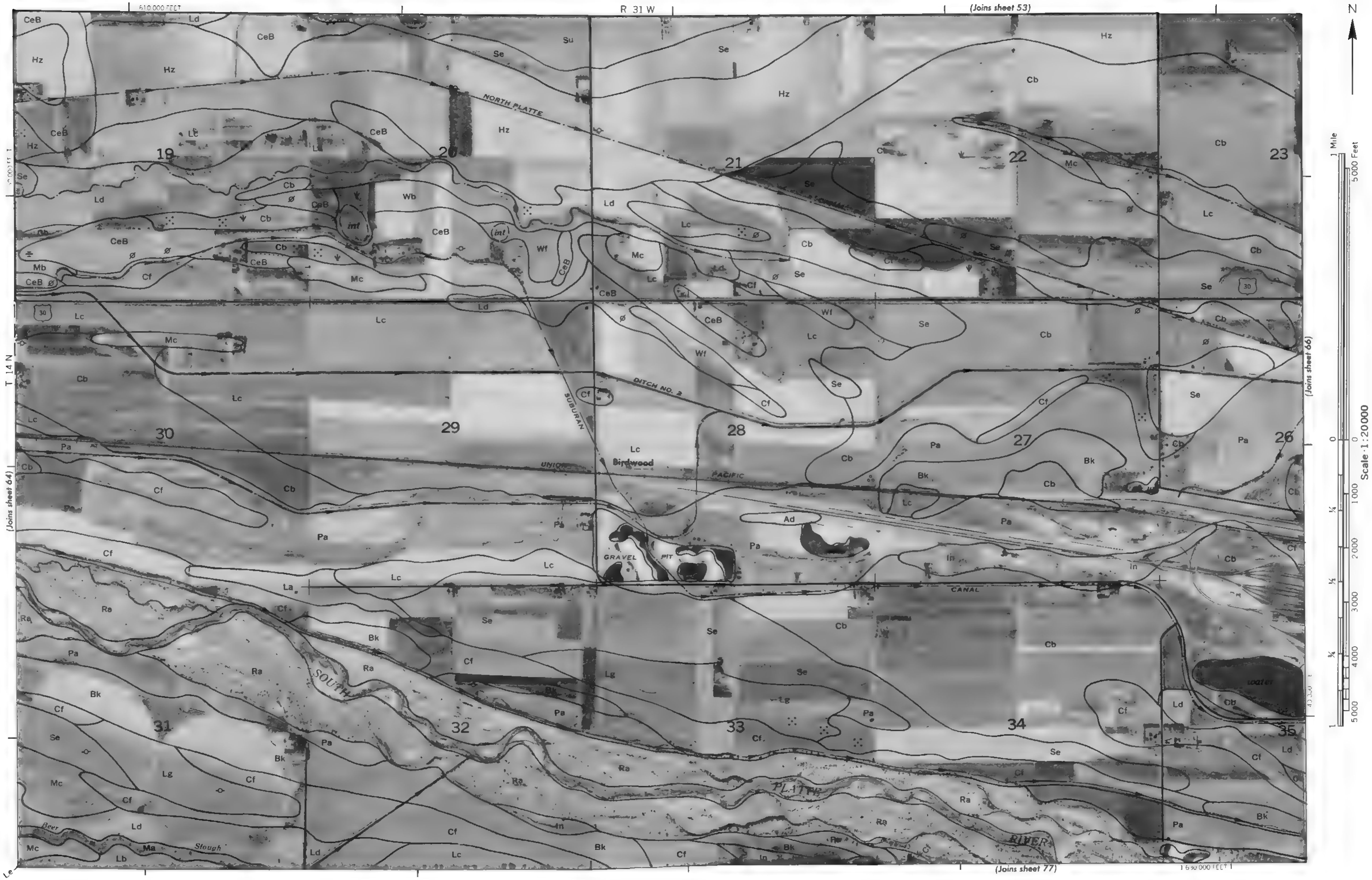
63

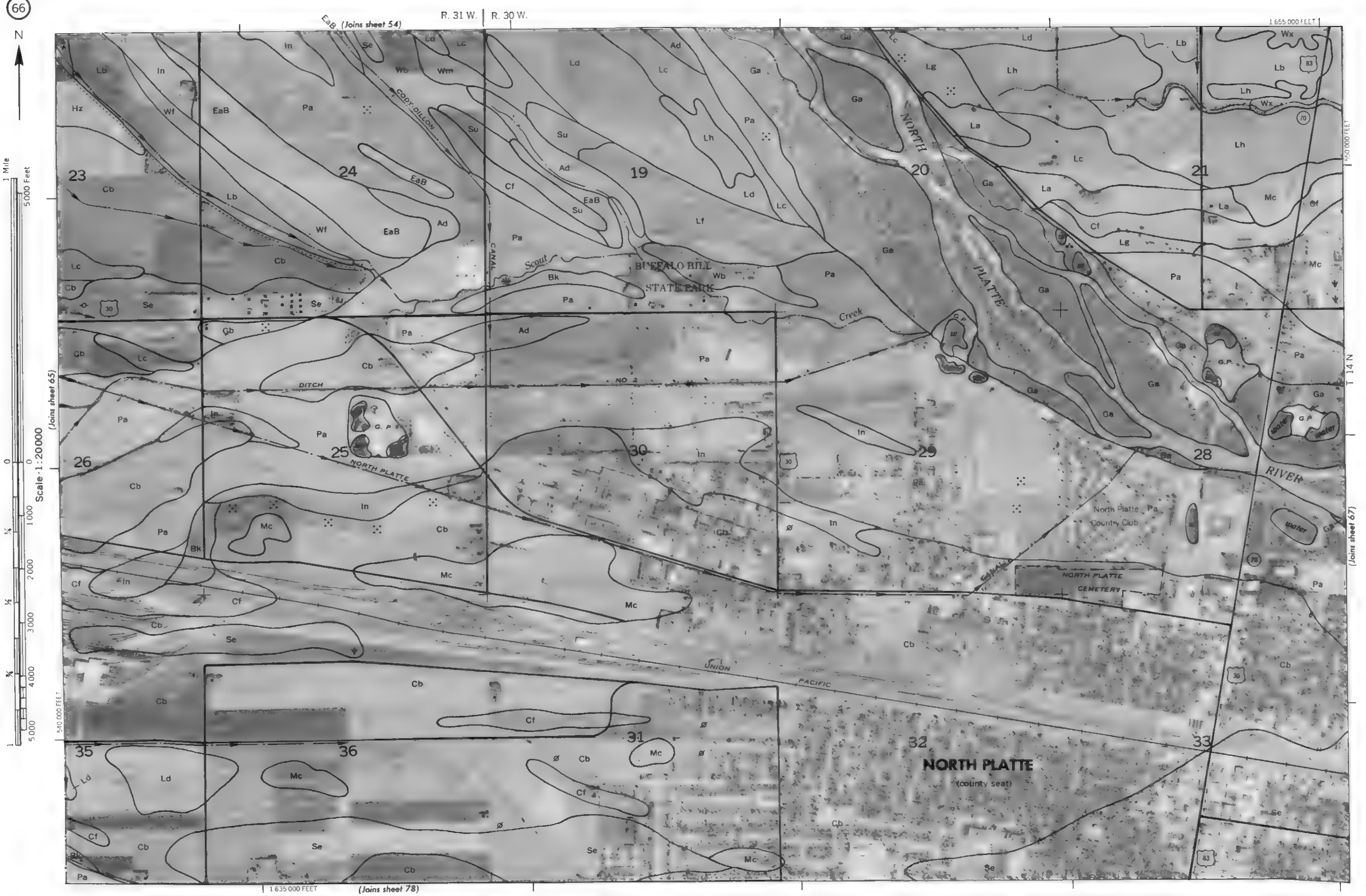


LINCOLN COUNTY, NEBRASKA NO. 63

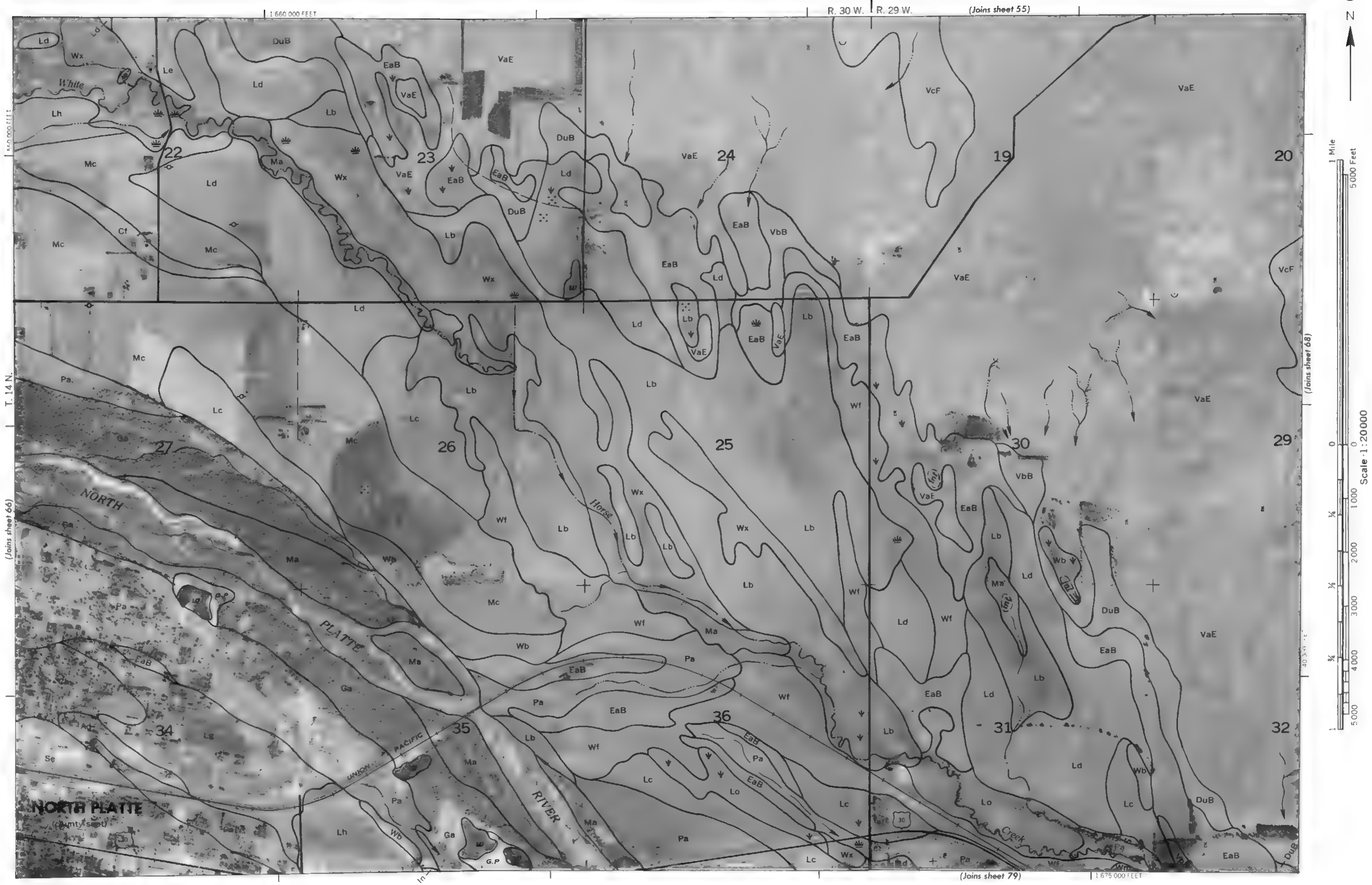


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

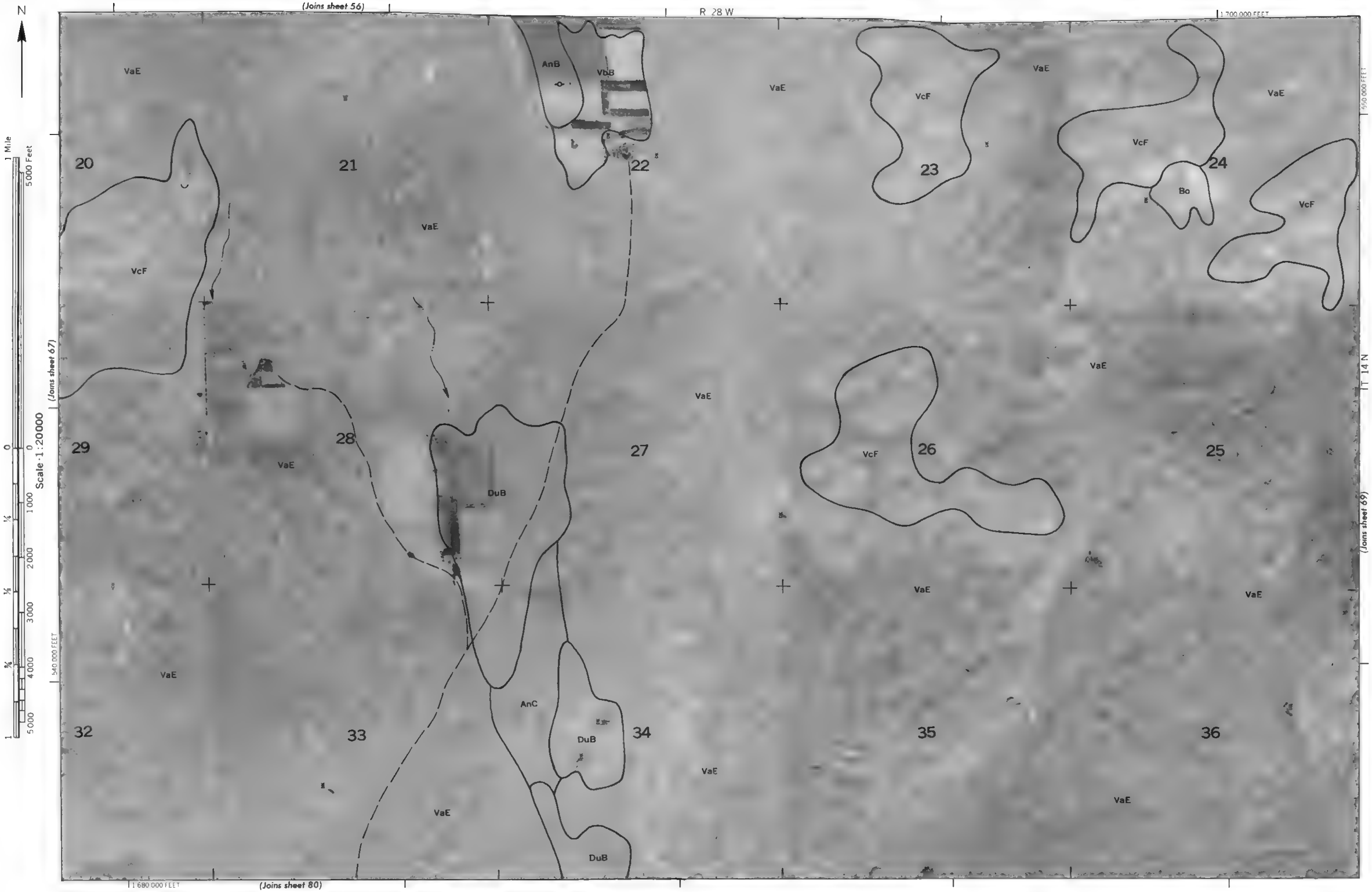

65
N
R 31 W
(Joins sheet 53)
(Joins sheet 64)
(Joins sheet 66)
(Joins sheet 77)
T 14 N
610 000 FEET
1 650 000 FEET
NORTH PLATTE
DITCH NO. 2
SUBURBAN
UNION PACIFIC
Birdwood
GRAVEL PIT
CANAL
SOUTH PLATTE RIVER
Beer Slough
water
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
1 Mile
5000 Feet
Scale 1:20000


66
N
R. 31 W.
R. 30 W.
(Joins sheet 54)
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 78)
1 655 000 FEET
1 635 000 FEET
550 000 FEET
540 000 FEET
T. 14 N.
Scale 1:20 000
1 Mile
5000 Feet
CODY-DILLON CANAL
BUFFALO BILL STATE PARK
Scout Creek
DITCH NO. 2
NORTH PLATTE RIVER
North Platte Country Club
NORTH PLATTE CEMETERY
UNION PACIFIC
NORTH PLATTE
(county seat)

LINCOLN COUNTY, NEBRASKA NO. 67

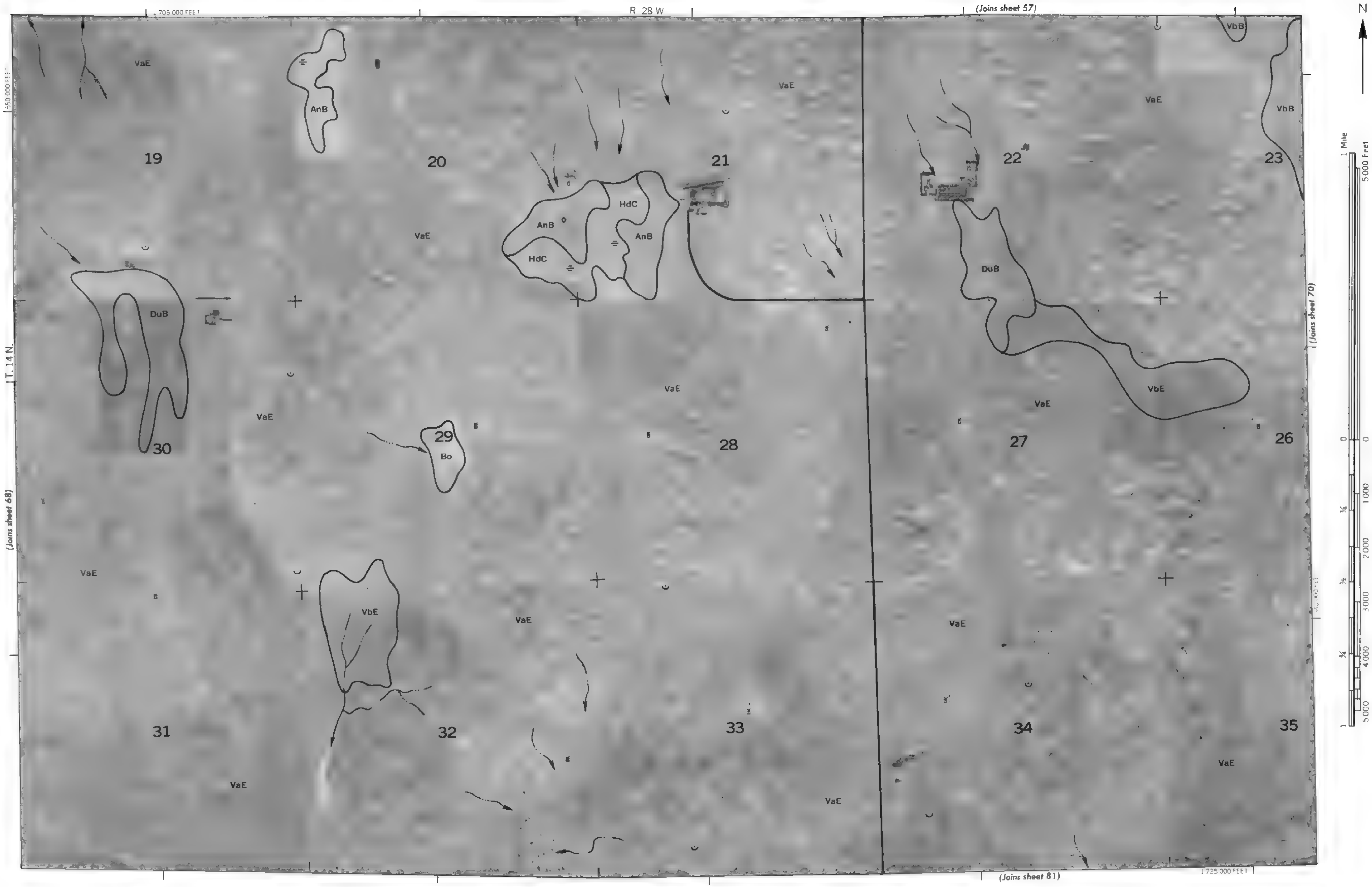


LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 68



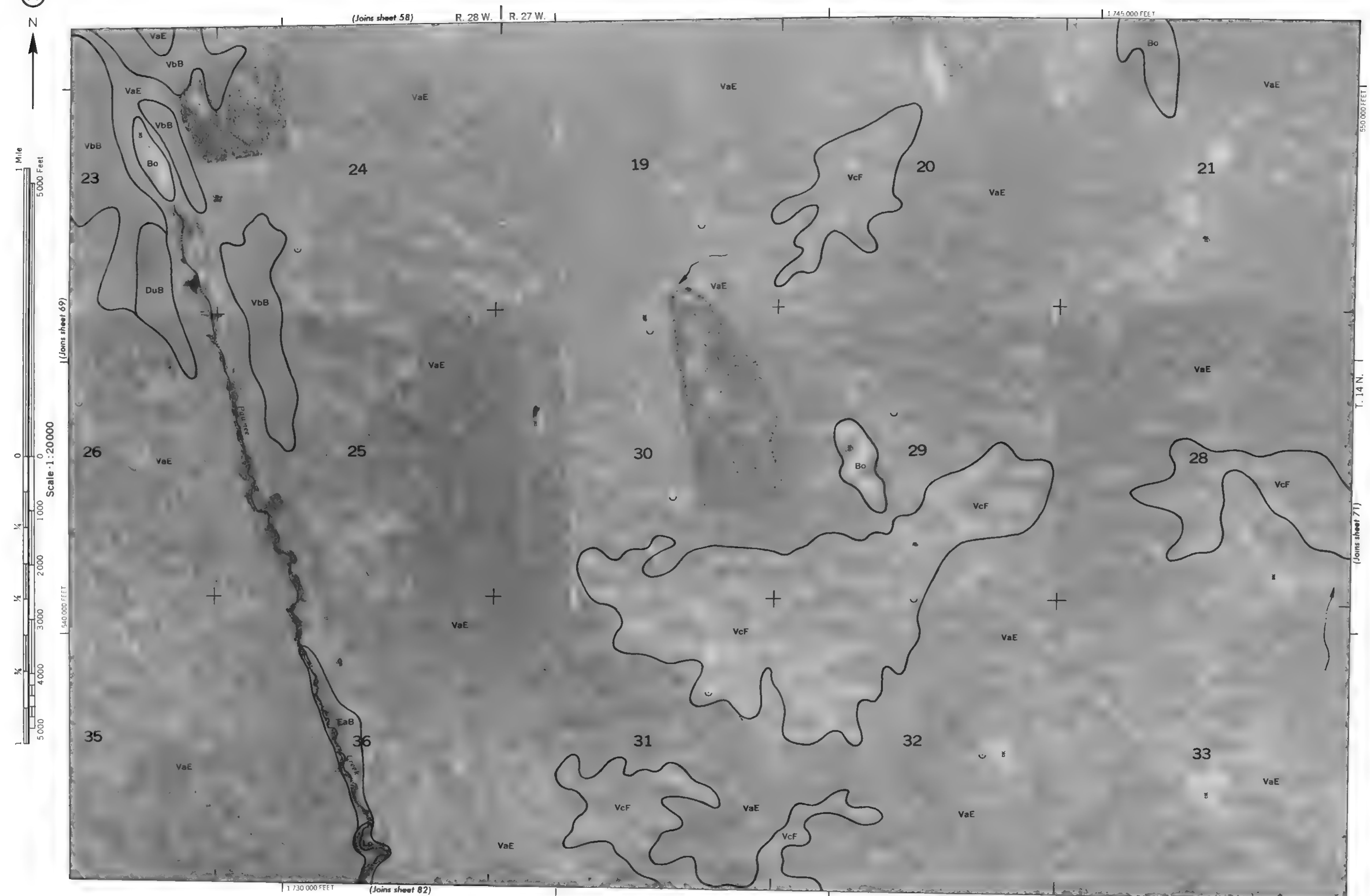
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 68



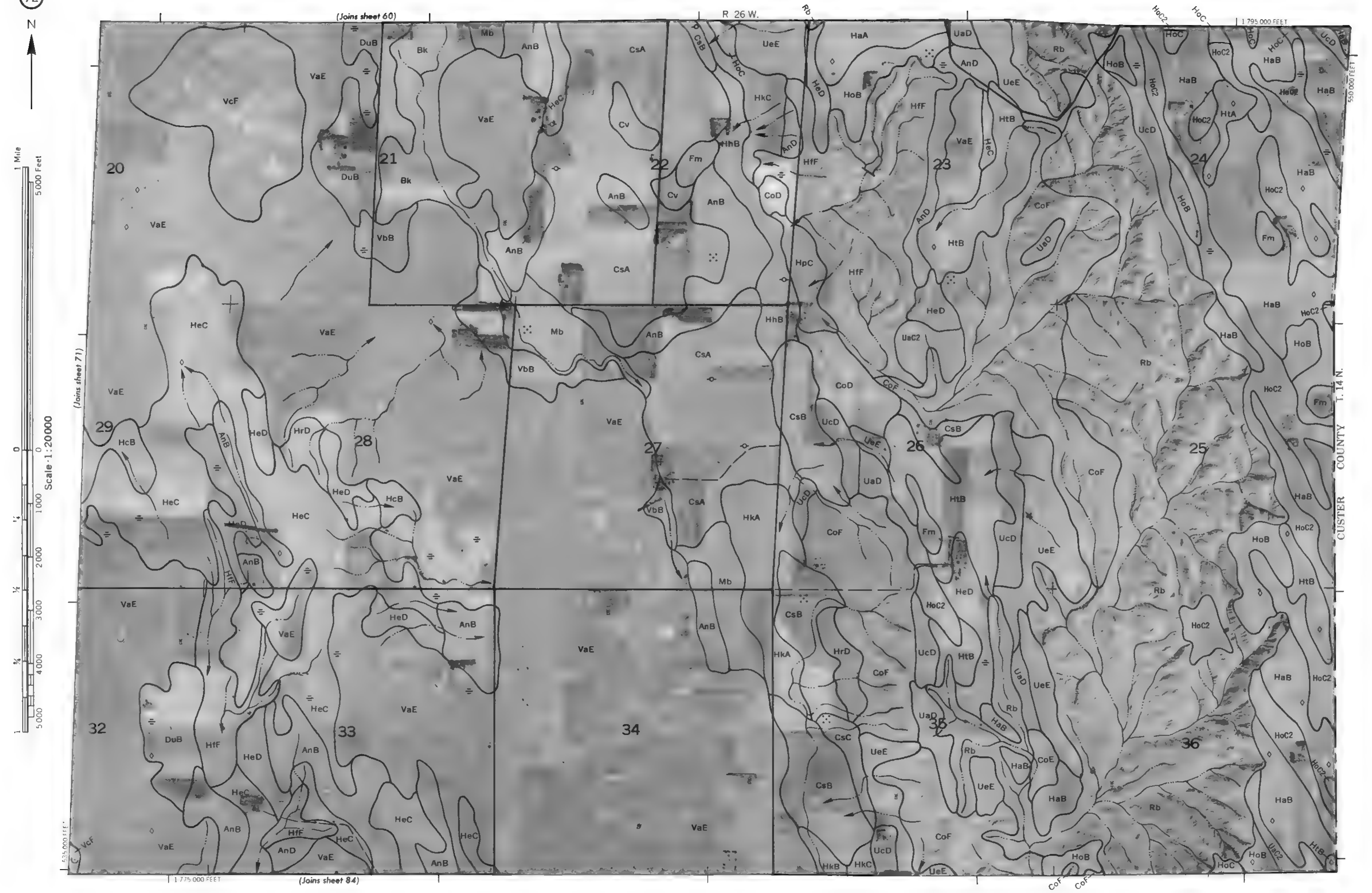
LINCOLN COUNTY, NEBRASKA NO. 69

This map is compiled on [illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

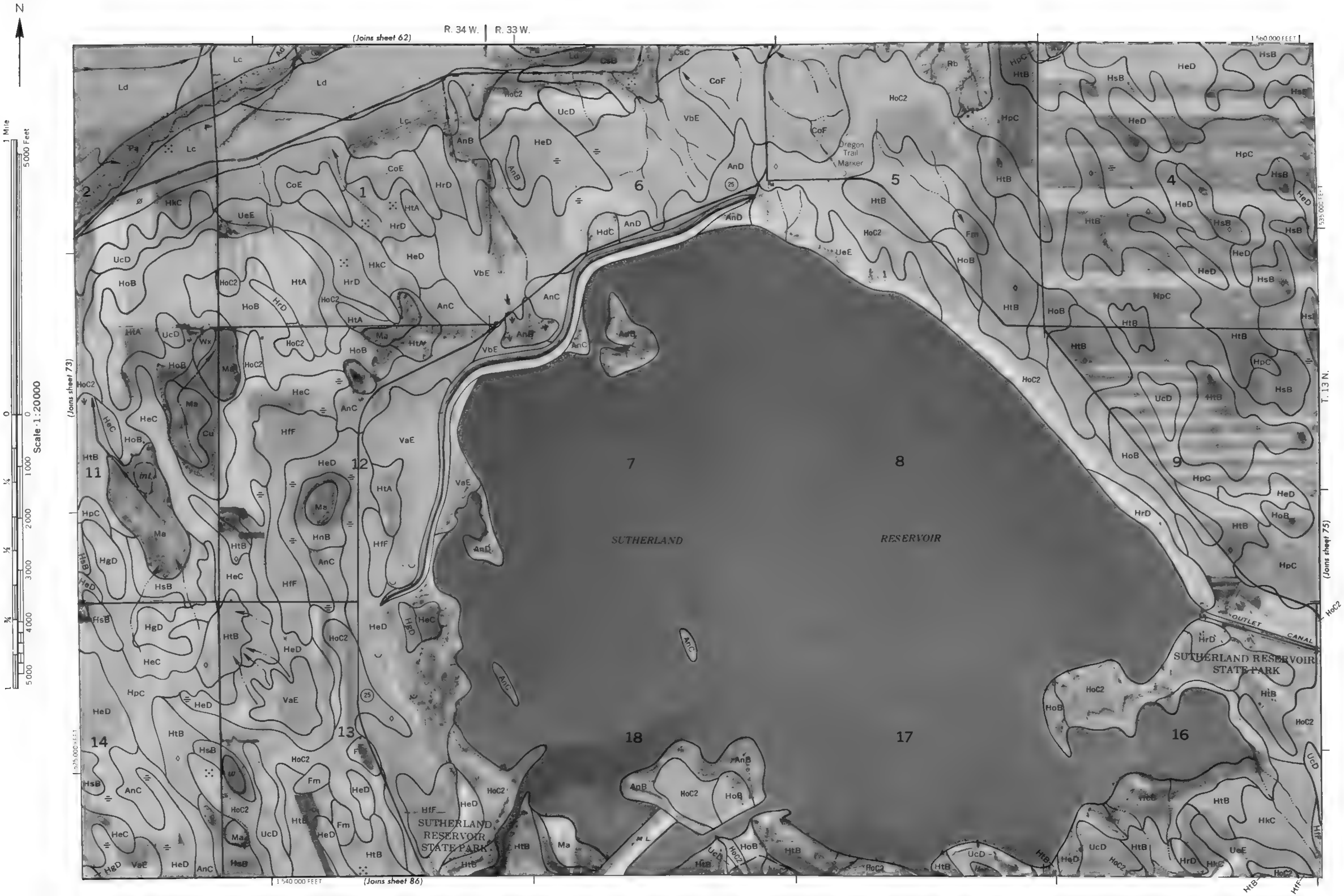

70
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 58)
R. 28 W.
R. 27 W.
1 745 000 FEET
550 000 FEET
T. 14 N.
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 82)
540 000 FEET
1 730 000 FEET
VaE
VbB
Bo
DuB
VcF
EaB
19
20
21
23
24
25
26
28
29
30
31
32
33
35
36

LINCOLN COUNTY, NEBRASKA NO. 71

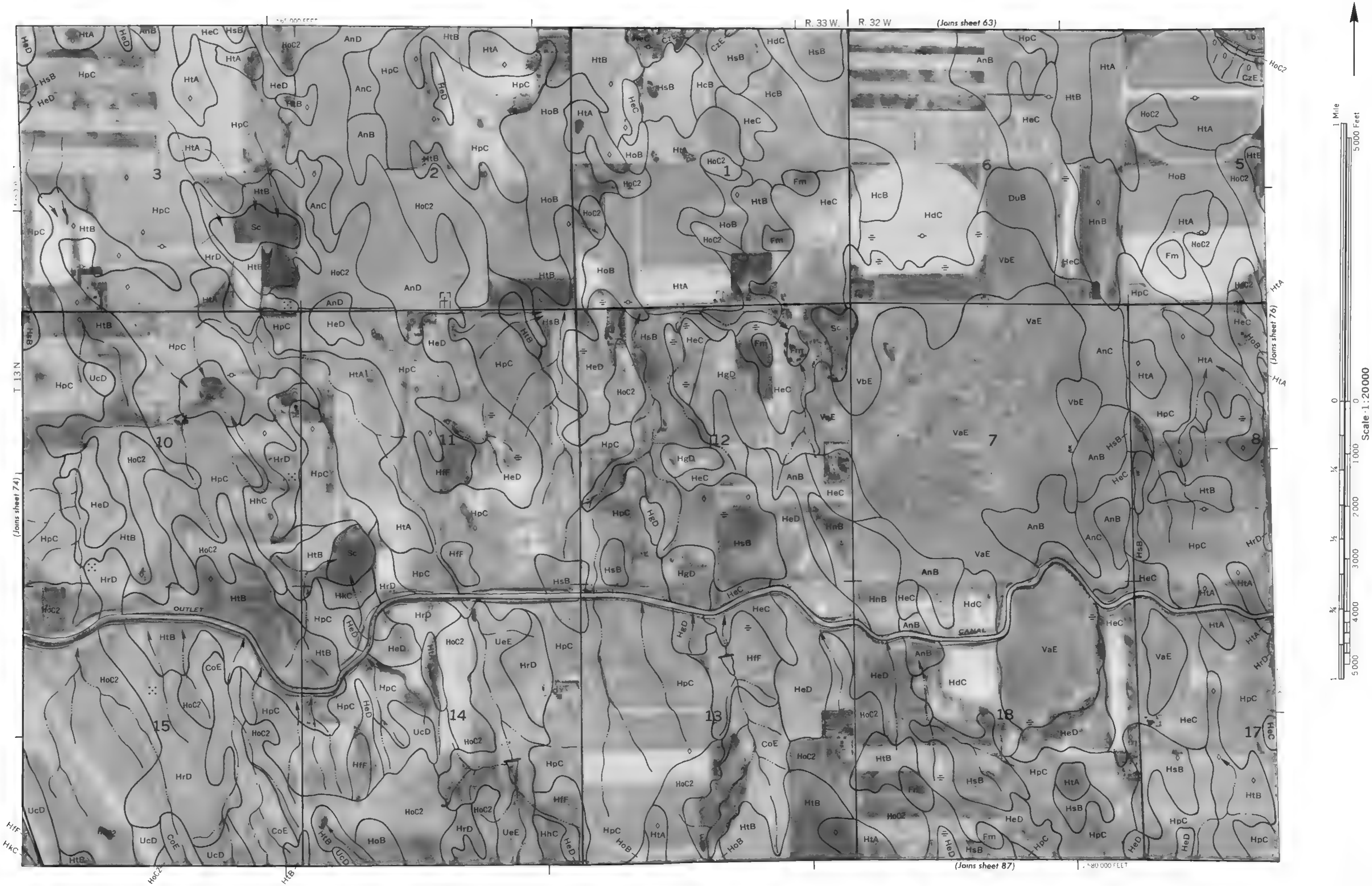
This map is compiled on 19[illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

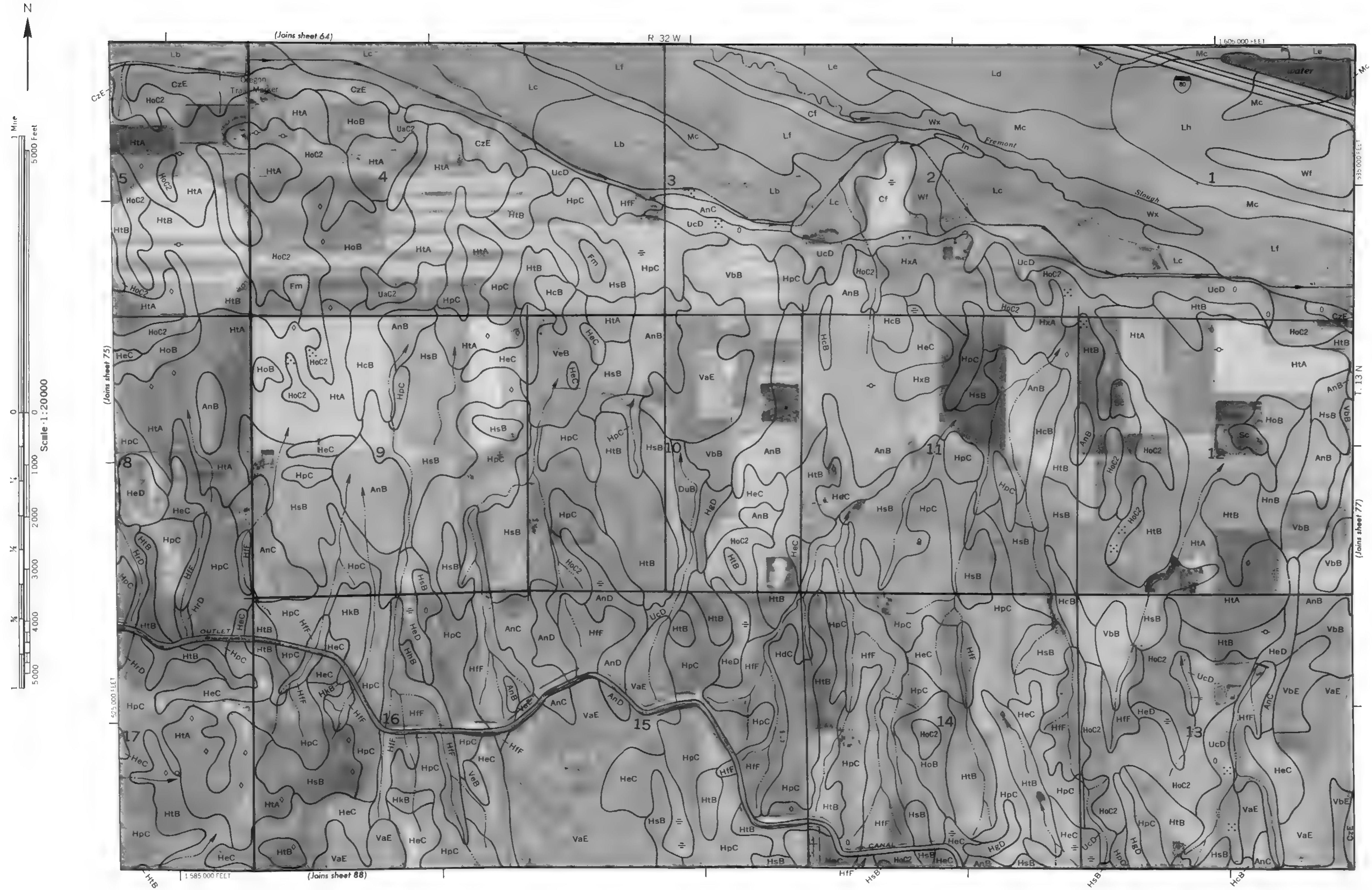

72
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 60)
(Joins sheet 71)
(Joins sheet 84)
R. 26 W.
T. 14 N.
CUSTER COUNTY
1 795 000 FEET
550 000 FEET
535 000 FEET
1 775 000 FEET
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
VcF
VaE
DuB
Bk
Mb
AnB
CsA
UeE
HaA
UaD
AnD
Rb
HoB
HoC
HoC2
HaB
UcD
HtA
HtB
HeC
Cv
HkC
HeD
HhB
Fm
CoD
HfF
HpC
CoF
CsB
UcD
HcB
HrD
VbB
HkA
HcB
CsC
CoE
HkB
HkC
UeE
LINCOLN COUNTY, NEBRASKA NO. 72

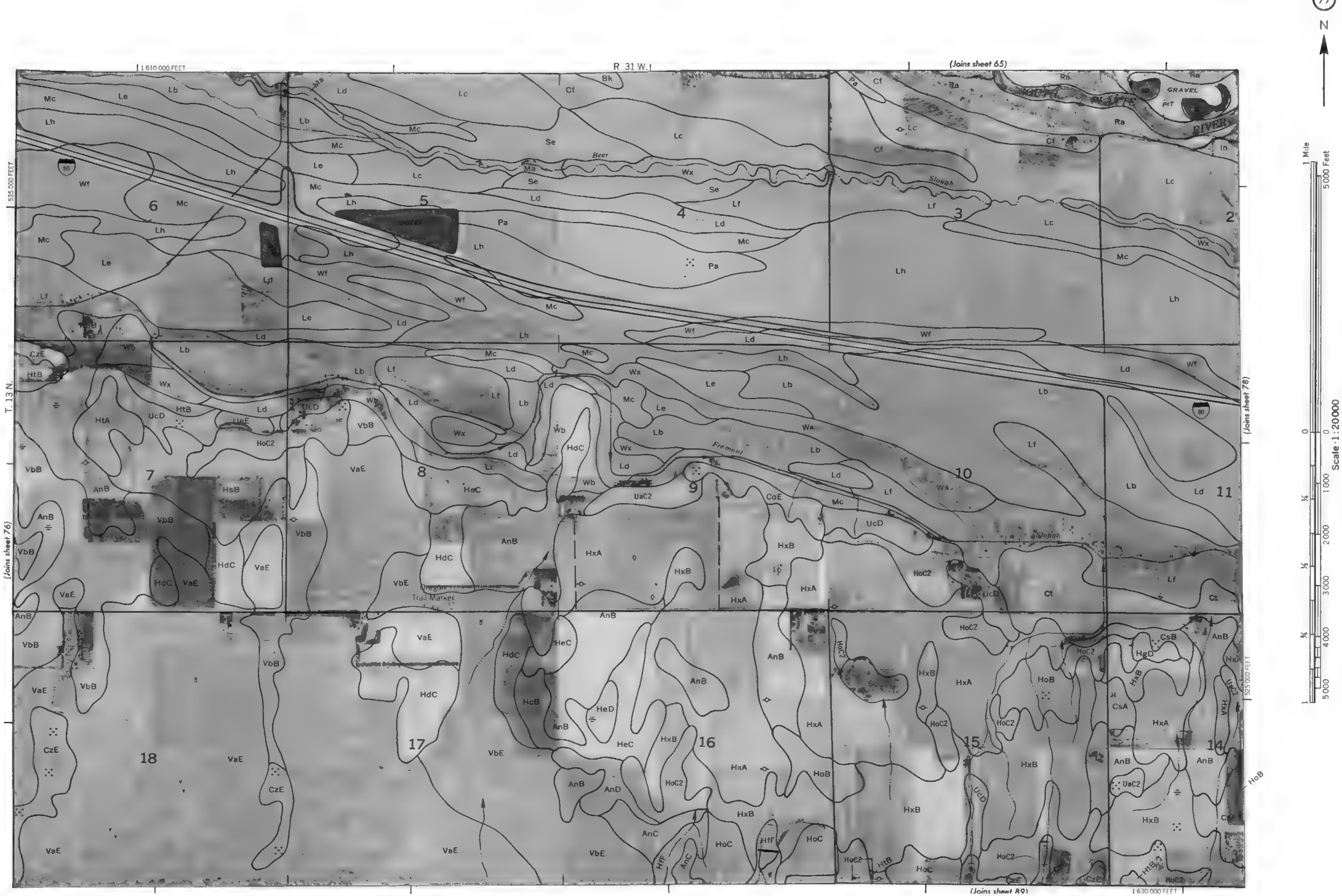
LINCOLN COUNTY, NEBRASKA NO. 73


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
R. 34 W.
R. 33 W.
(Joins sheet 62)
(Joins sheet 73)
(Joins sheet 75)
(Joins sheet 86)
T. 13 N.
1 540 000 FEET
Oregon Trail Marker
SUTHERLAND
RESERVOIR
OUTLET
CANAL
SUTHERLAND RESERVOIR STATE PARK
SUTHERLAND RESERVOIR STATE PARK
25
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18

LINCOLN COUNTY, NEBRASKA NO. 75

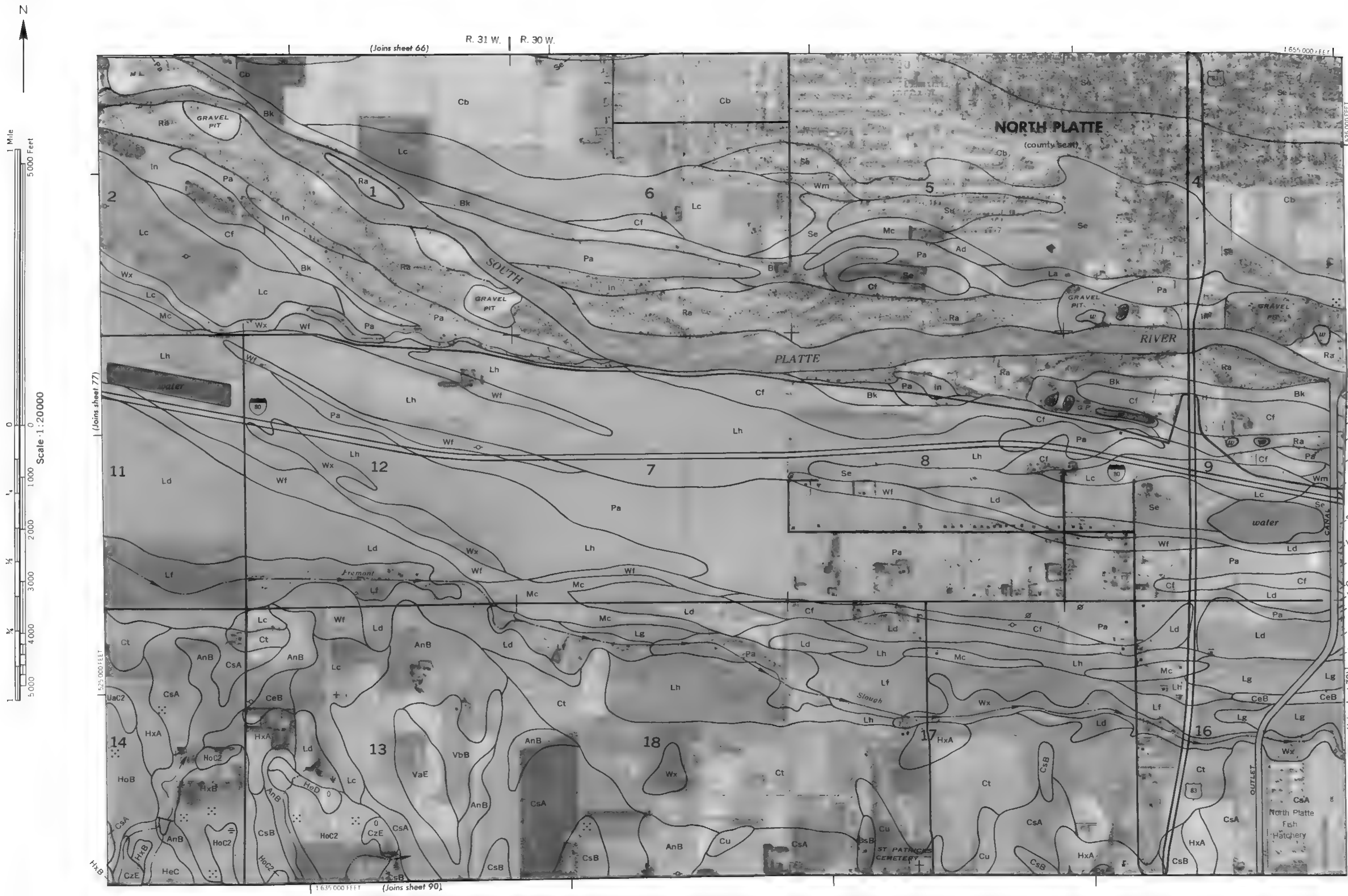


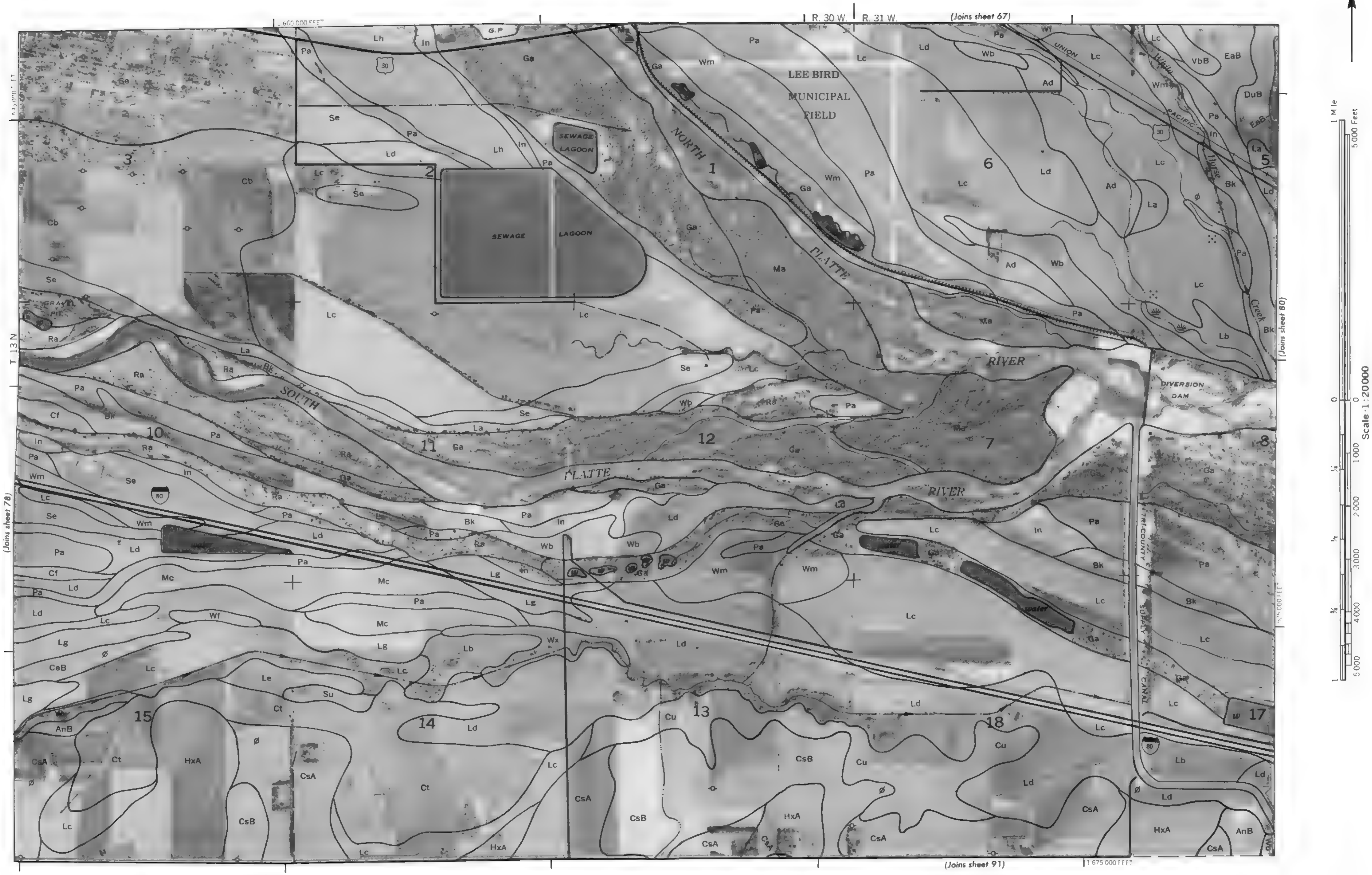

N
Scale 1:20000
(Joins sheet 64)
(Joins sheet 75)
(Joins sheet 77)
(Joins sheet 88)
R 32 W
T. 13 N
1 585 000 FEET
Oregon Trail Marker
Fremont Slough
OUTLET
CANAL
Water



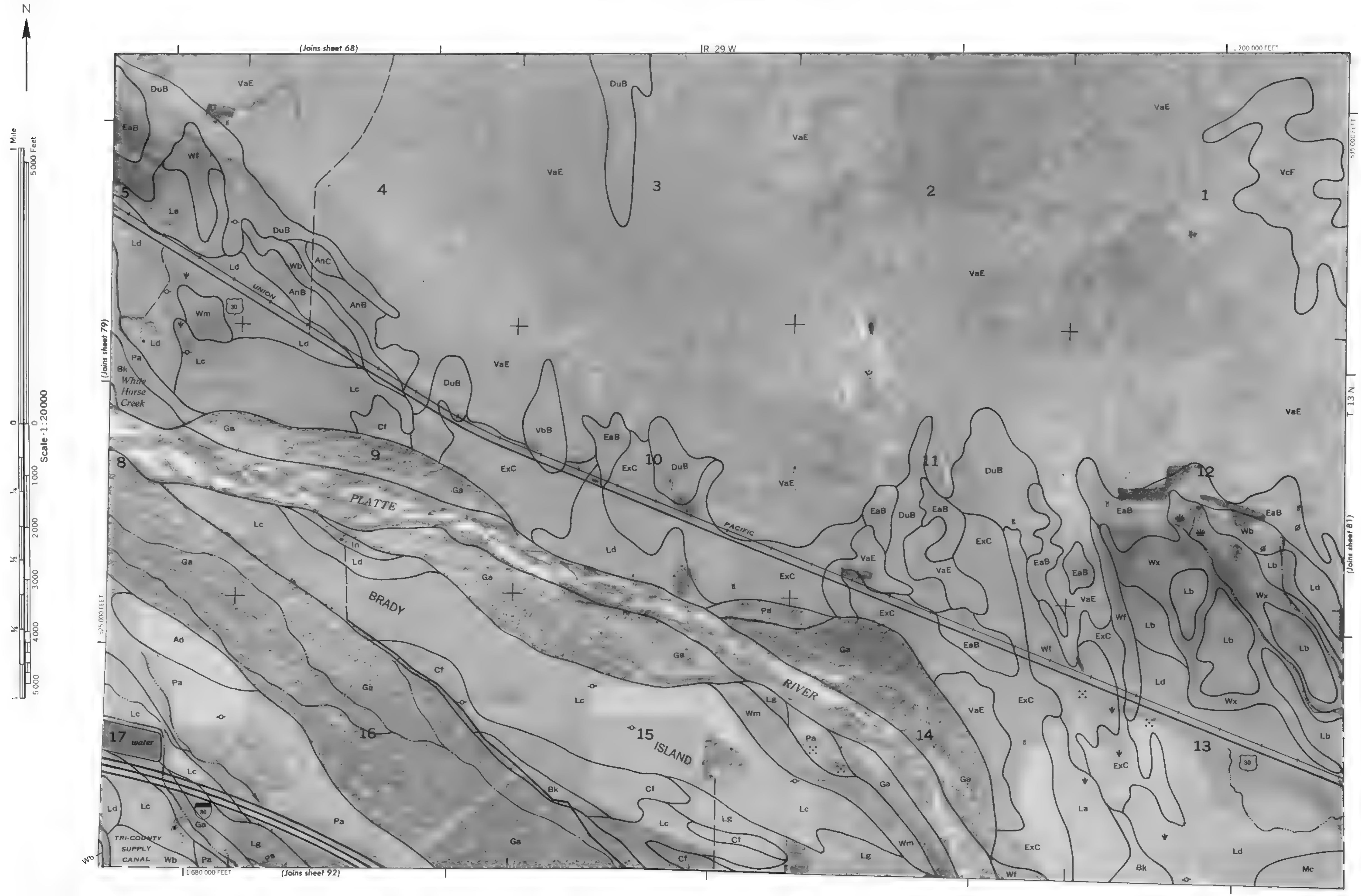
LINCOLN COUNTY, NEBRASKA NO. 77

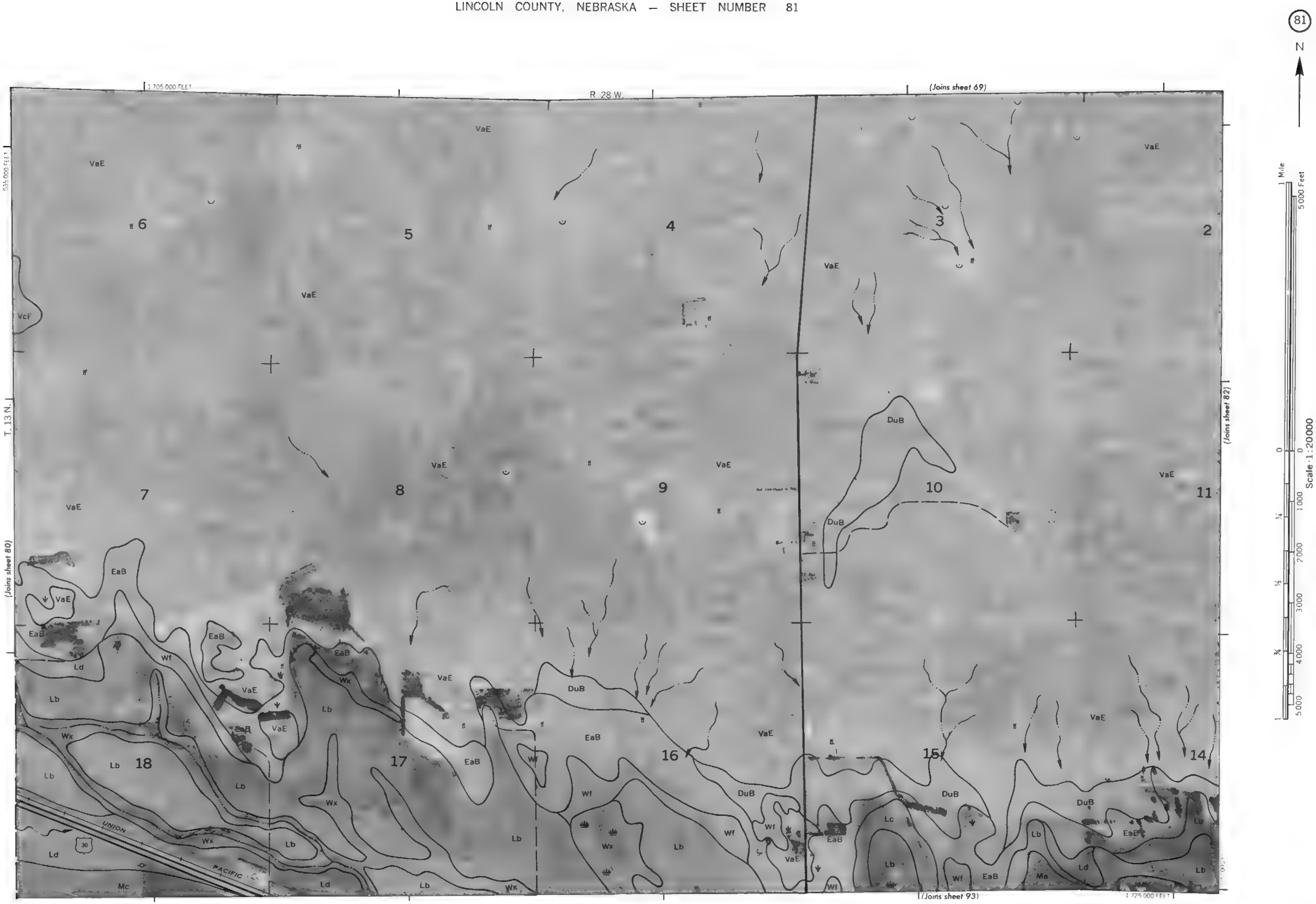
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 66)
R. 31 W.
R. 30 W.
1 655 000 FEET
535 000 FEET
NORTH PLATTE
(county seat)
SOUTH
PLATTE
RIVER
GRAVEL PIT
water
CANAL
OUTLET
Fremont
Slough
ST PATRICKS CEMETERY
North Platte Fish Hatchery
13 N.
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 90)
525 000 FEET
1 635 000 FEET
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18



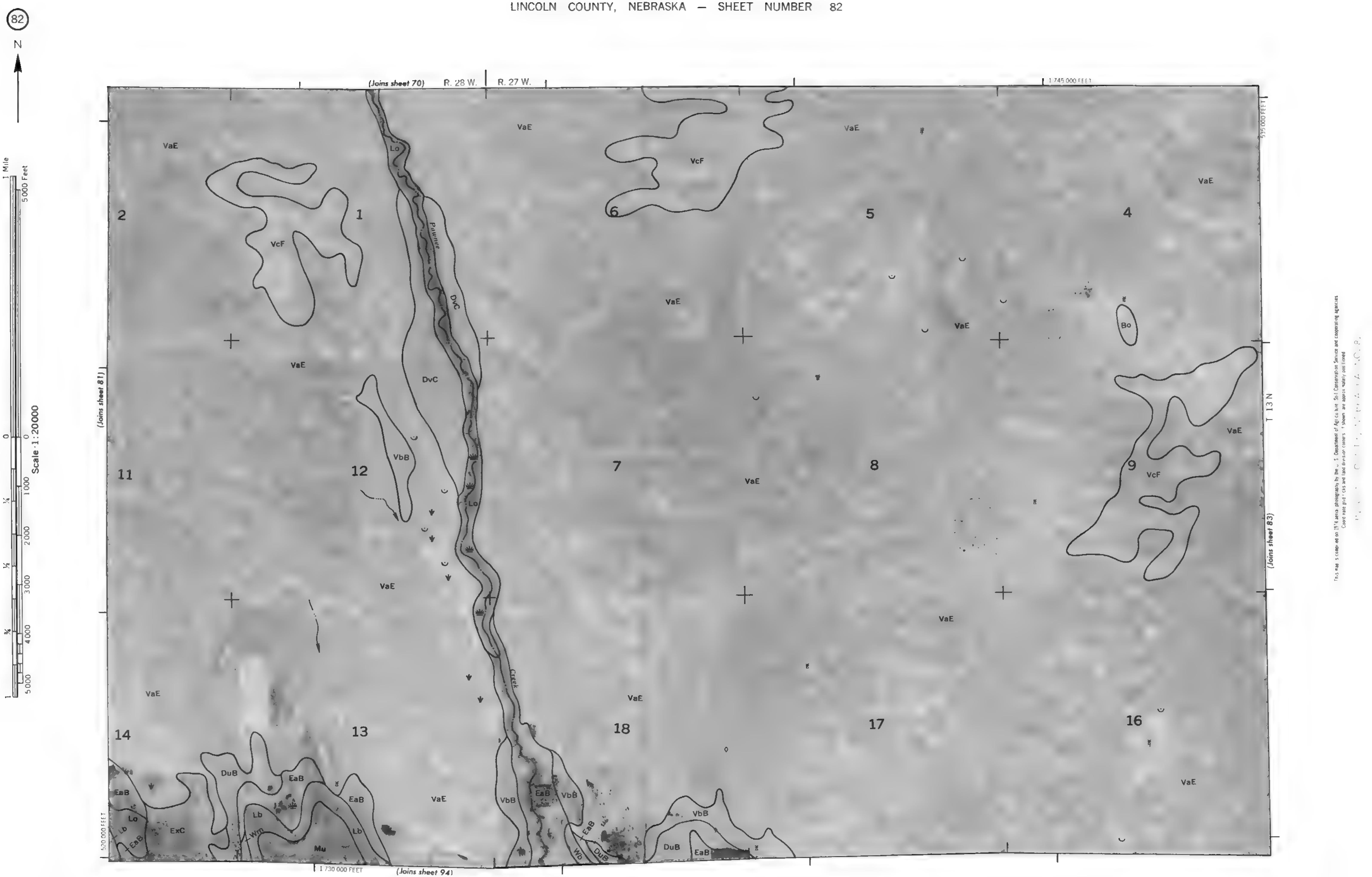
LINCOLN COUNTY, NEBRASKA NO. 79


80
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 68)
R 29 W
700 000 FEET
535 000 FEET
T 13 N
(Joins sheet 79)
(Joins sheet 81)
(Joins sheet 92)
1 680 000 FEET
525 000 FEET
PLATTE RIVER
BRADY ISLAND
UNION PACIFIC
White Horse Creek
TRI-COUNTY SUPPLY CANAL
17 water
30
80
1
2
3
4
5
8
9
10
11
12
13
14
15
16
VaE
VcF
DuB
EaB
Wf
La
Ld
Lc
Wb
AnC
AnB
Wm
Pa
Bk
Cf
VbB
ExC
Ga
In
Pd
Lb
Wx
Ad
Lg
Mc

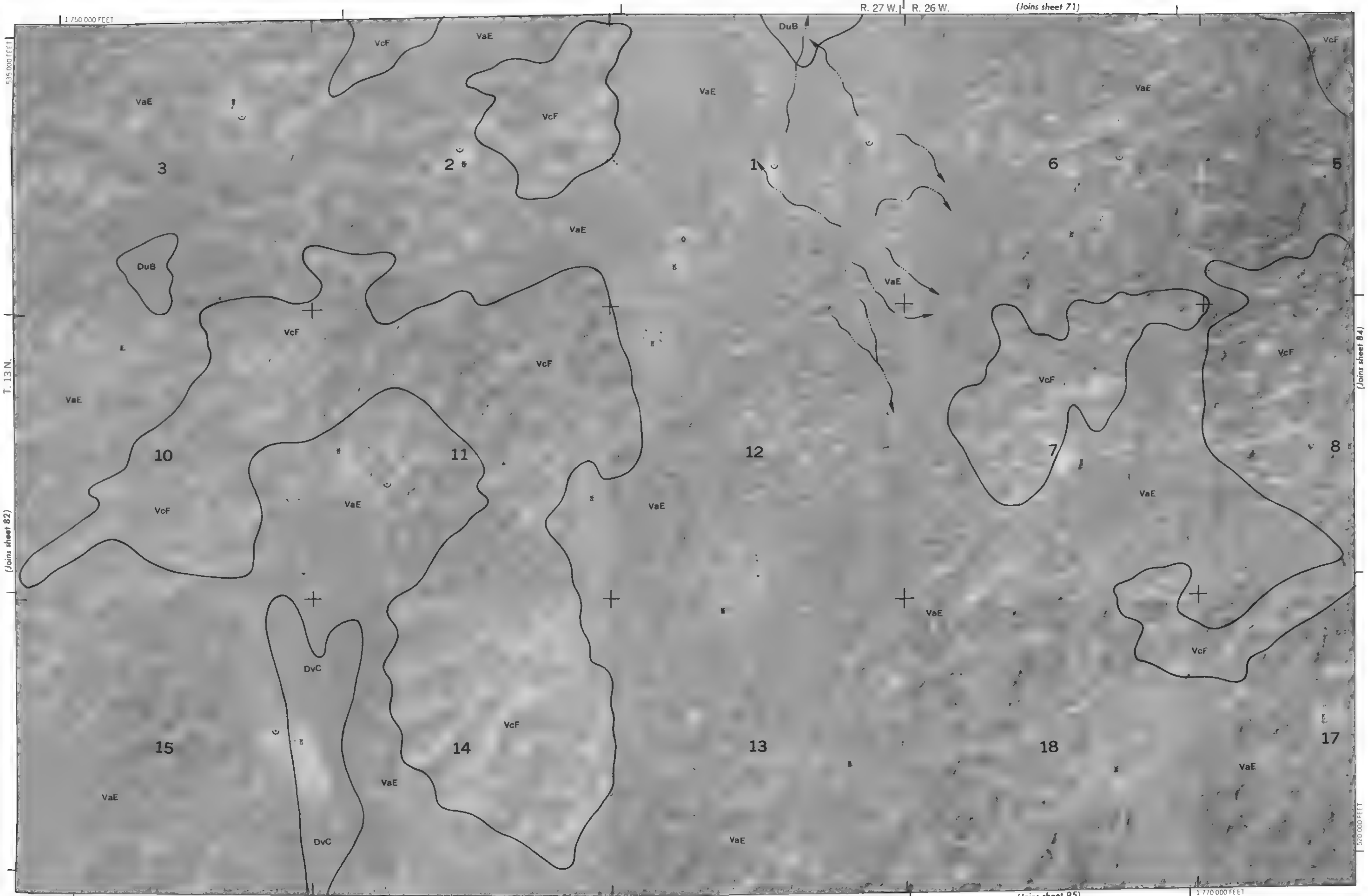


LINCOLN COUNTY, NEBRASKA NO. 81

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


82
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 70)
R. 28 W.
R. 27 W.
1 745 000 FEET
535 000 FEET
(Joins sheet 81)
(Joins sheet 83)
T. 13 N.
(Joins sheet 94)
1 730 000 FEET
520 000 FEET
Pawnee
Creek
1
2
4
5
6
7
8
9
11
12
13
14
16
17
18
VaE
VcF
Lo
DvC
VbB
Bo
DuB
EaB
Lb
ExC
Wm
Mu
Wb

N

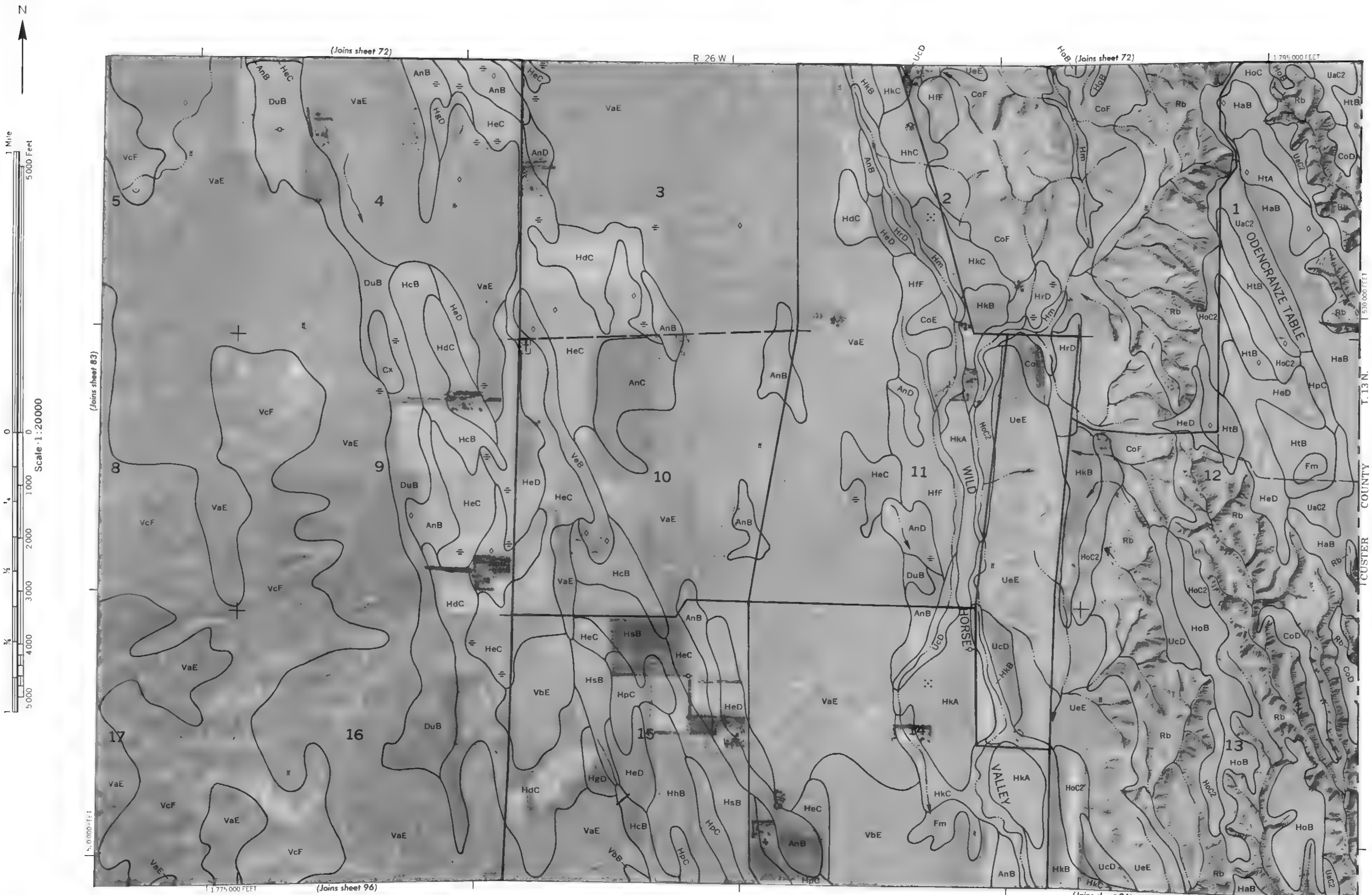


Scale 1:20000

1 Mile
5000 Feet
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000

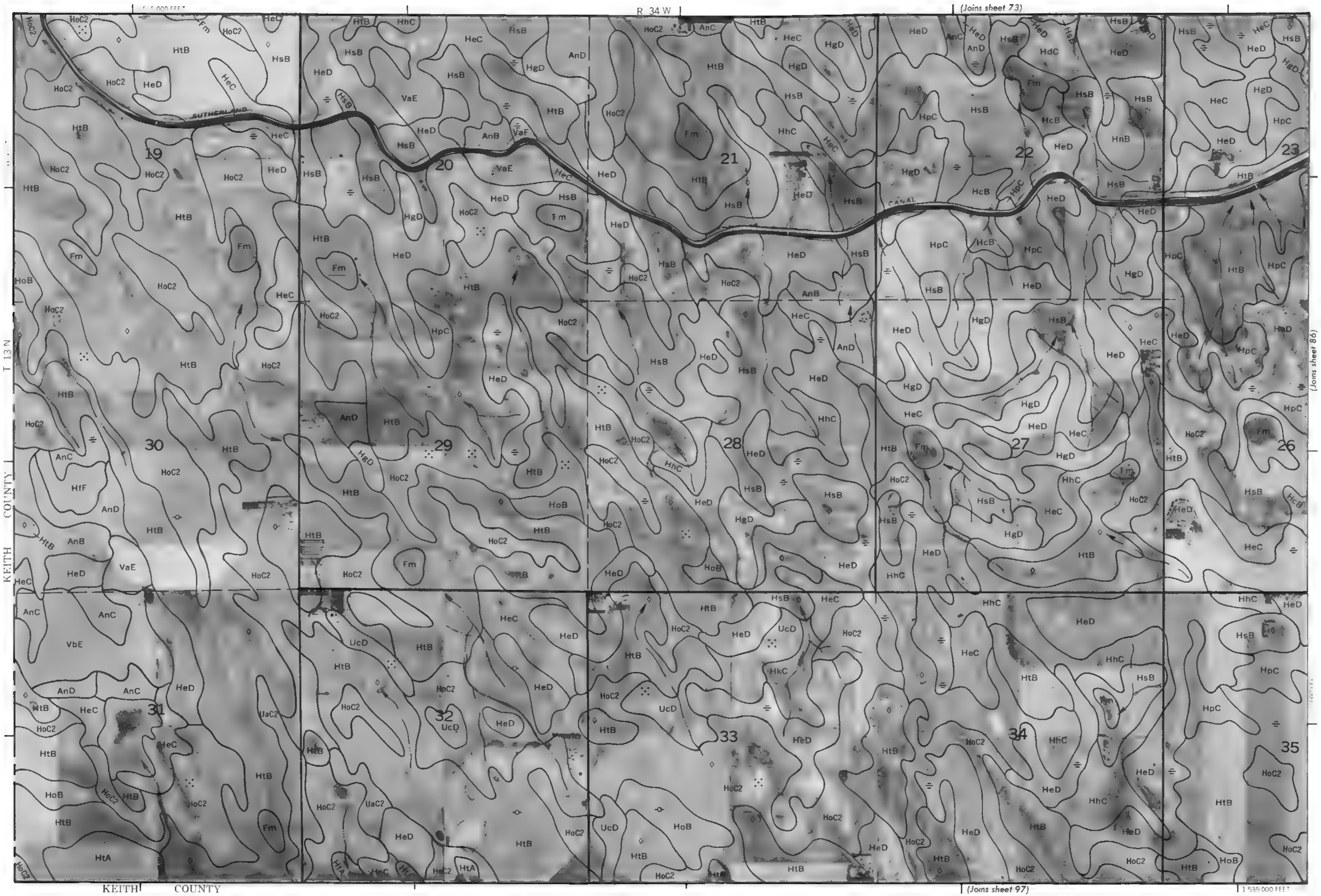
LINCOLN COUNTY, NEBRASKA NO. 83

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


84
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 72)
R. 26 W.
(Joins sheet 83)
(Joins sheet 96)
T. 13 N.
CUSTER COUNTY
ODENCRANZE TABLE
WILD HORSE VALLEY
1 795 000 FEET
1 775 000 FEET
530 000 FEET
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
VaE
VcF
DuB
AnB
HeC
HeD
HdC
HcB
AnC
HsB
HpC
VbE
HkA
HkB
UeE
CoF
HoB
HoC2
Rb
HaB
HtB
UaC2
CoD
UcD
Fm

85

N

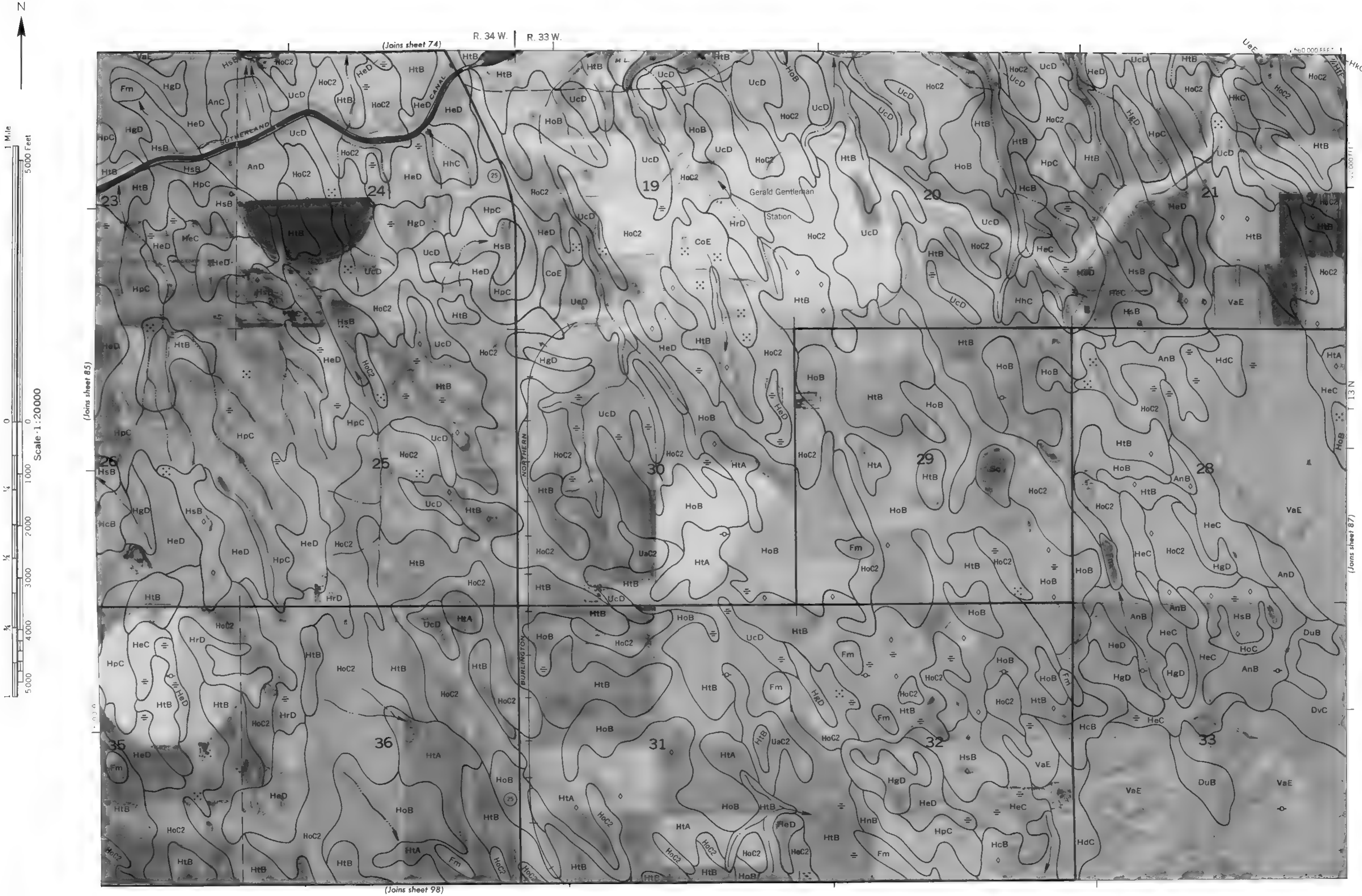


1 Mile

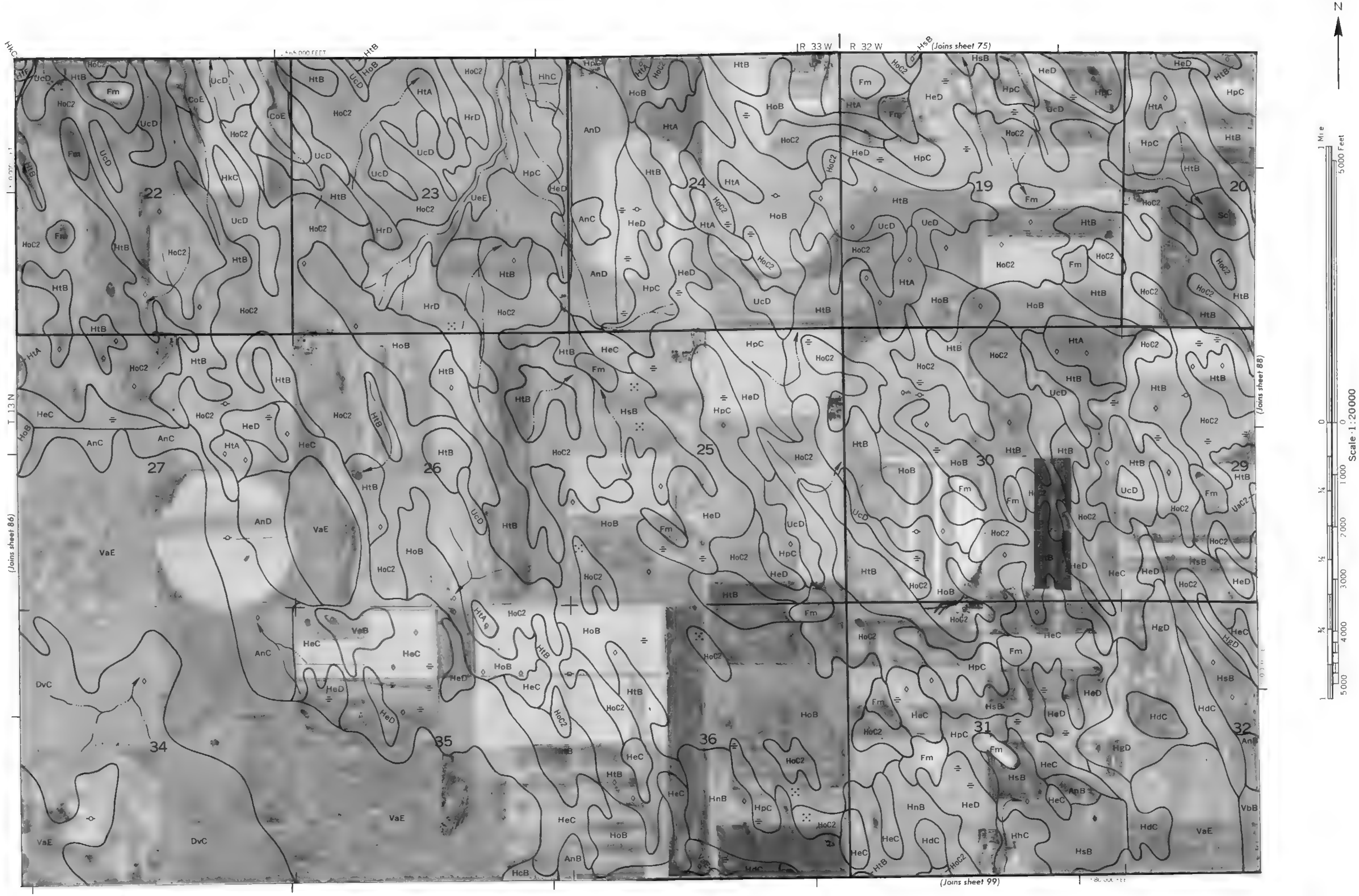
5000 Feet

Scale 1:20000

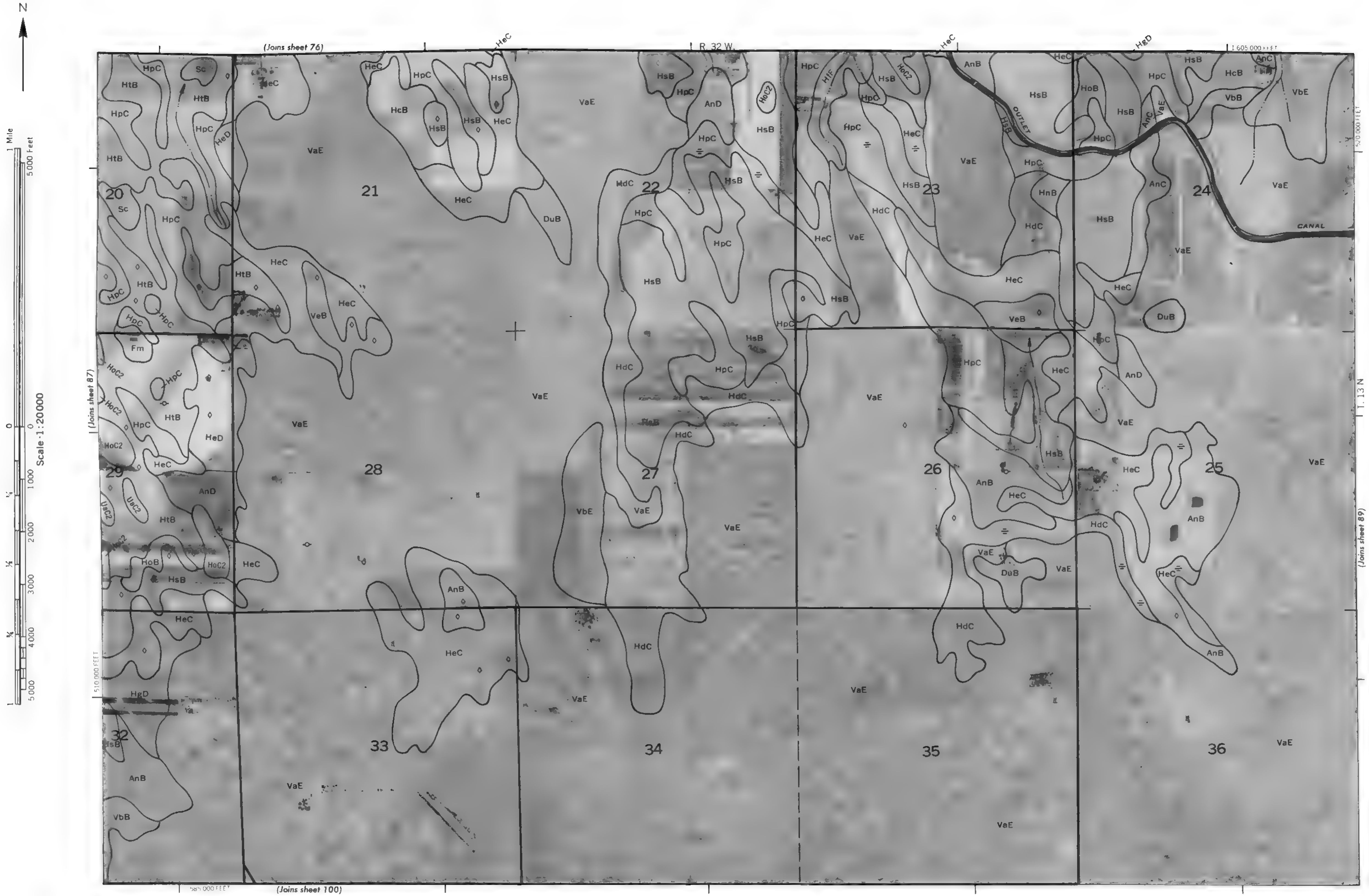
LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 86



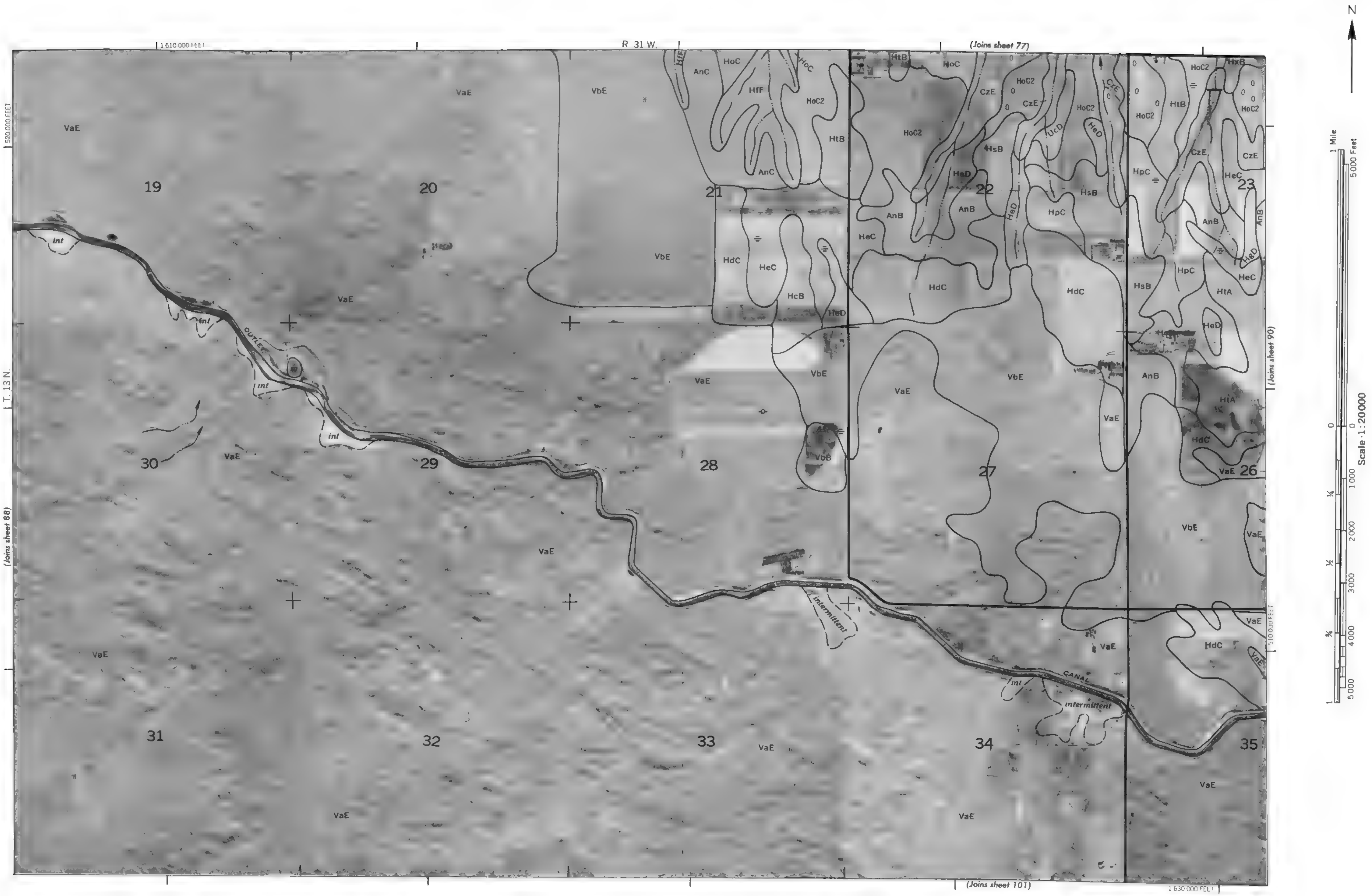
87


(Joins sheet 75)
R 33 W
R 32 W
T 13 N
(Joins sheet 86)
(Joins sheet 88)
(Joins sheet 99)
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
N
1 Mile
5000 Feet
Scale 1:20000
LINCOLN COUNTY, NEBRASKA NO. 87

88


N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 76)
(Joins sheet 87)
(Joins sheet 89)
(Joins sheet 100)
R. 32 W.
T. 13 N.
1 605 000 FEET
520 000 FEET
510 000 FEET
585 000 FEET
OUTLET
CANAL
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
HpC
Sc
HtB
HeD
HeC
HcB
HsB
VaE
AnD
HoC2
DuB
HdC
AnB
VeB
Fm
HgD
VbB
VbE
HnB
AnC
HfF
HgD
UaC2

89



LINCOLN COUNTY, NEBRASKA NO. 89

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(90)

N

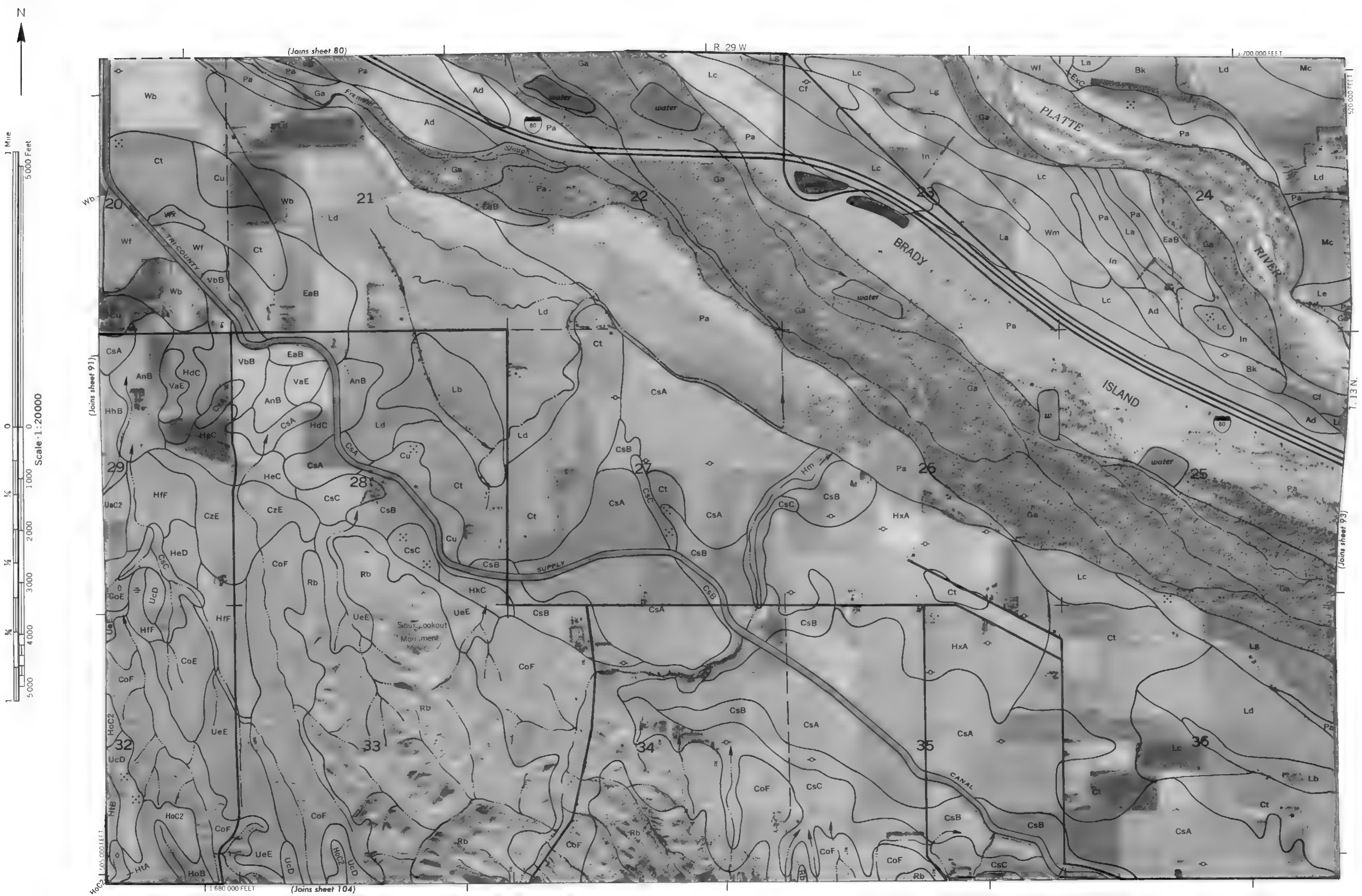
1 Mile
5000 Feet
Scale 1:20000

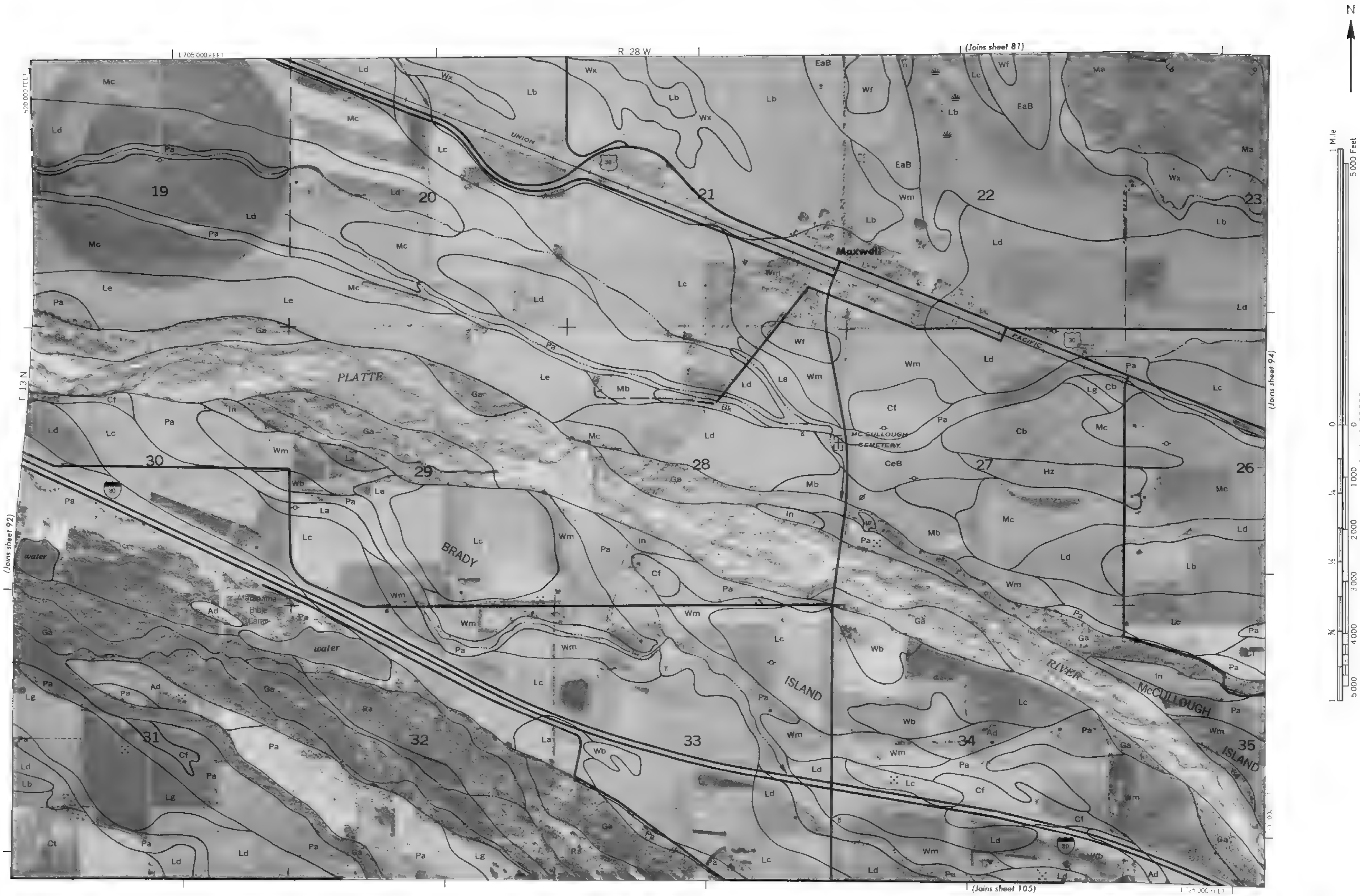
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 90


91
N
R. 30 W.
R. 29 W.
(Joins sheet 79)
(Joins sheet 92)
(Joins sheet 103)
(Joins sheet 90)
1 655 000 FEET
1 675 000 FEET
520 000 FEET
T. 13 N.
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
FLORAL LAWNS MEMORIAL GARDENS
HxA
CsB
CsA
CzE
CoF
CoE
UcD
HoC2
UeE
HoB
UaD
HkB
HrD
HkB
Hm
HaA
Rb
HaB
HoC
HfF
CsC
CoD
UaC2
UcD
HtA
HtB
AnB
Wb
HhB
1 Mile
5000 Feet
Scale 1:20000
LINCOLN COUNTY, NEBRASKA NO. 91

92


N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
(Joins sheet 80)
(Joins sheet 91)
(Joins sheet 93)
(Joins sheet 104)
R. 29 W.
T. 13 N.
1 700 000 FEET
520 000 FEET
505 000 FEET
1 680 000 FEET
PLATTE
RIVER
BRADY
ISLAND
Fremont
Slough
TRI-COUNTY
SUPPLY
CANAL
Sioux Lookout Monument
water
80
20
21
22
23
24
25
26
27
28
29
32
33
34
35
36
Wb
Wf
Ct
Cu
Ld
Pa
Ga
Ad
Lc
Lg
Bk
La
Mc
Wm
In
Le
EaB
VbB
CsA
CsB
CsC
AnB
HdC
VaE
HeC
HhB
HfF
CzE
CoF
HeD
UcD
CoE
Rb
UeE
HxA
HkC
Hm
Lb
HoC2
HoB
HtA
HtB
UaC2
ExC



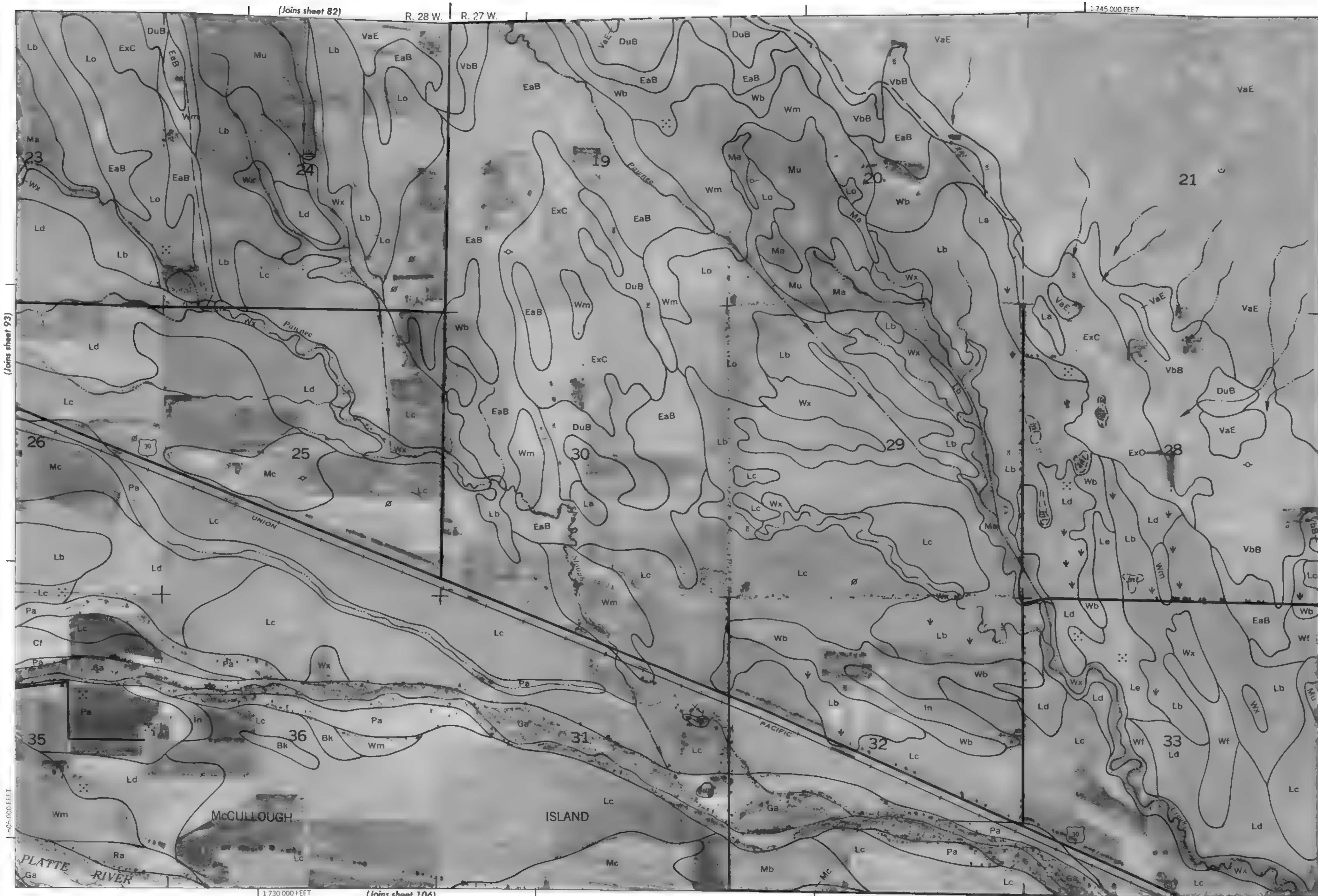
LINCOLN COUNTY, NEBRASKA NO. 93

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

94

N

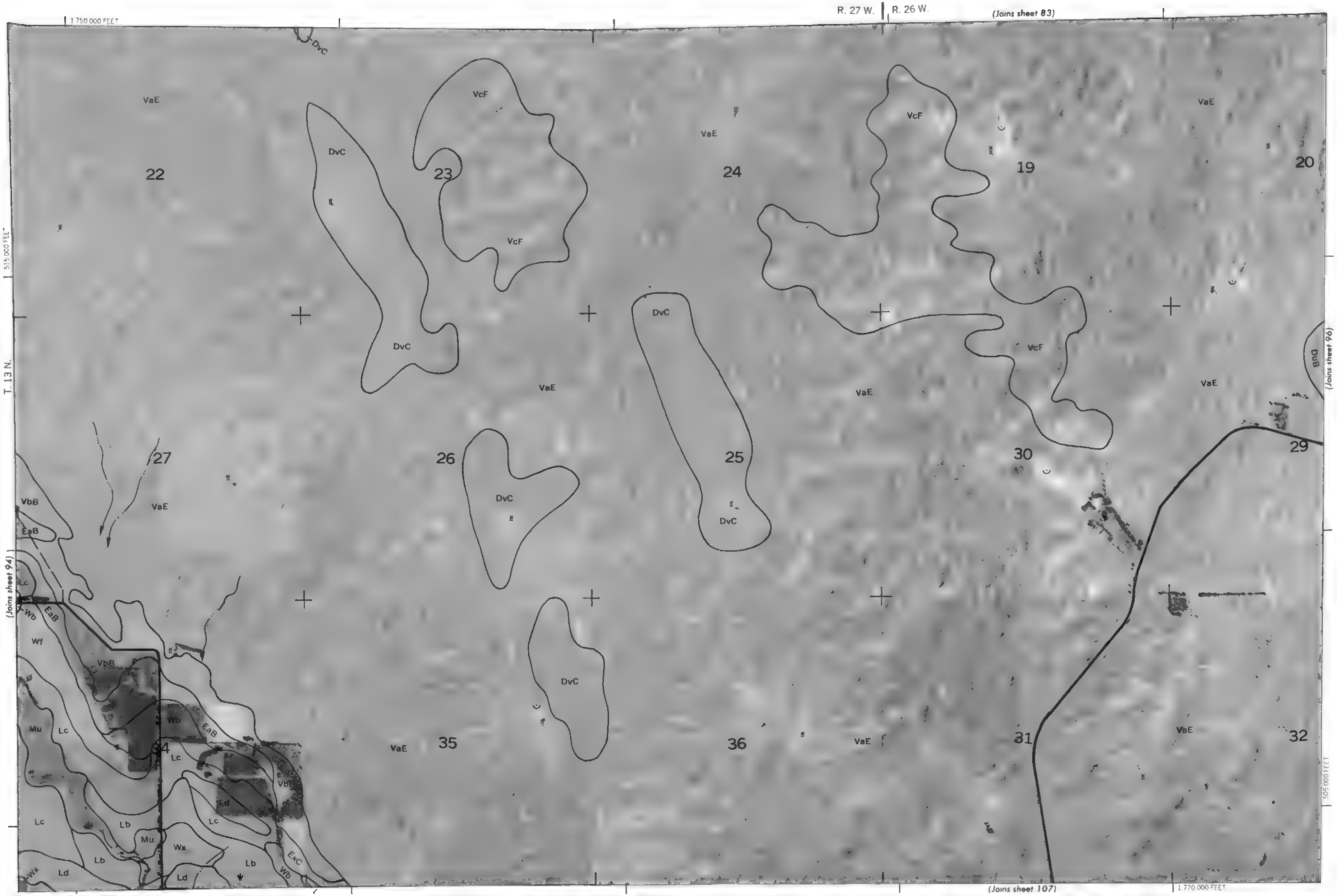
1 Mile
5000 Feet
0
0
Scale 1:20000
1000
¼
2000
½
3000
¾
4000
1
5000



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 94

95

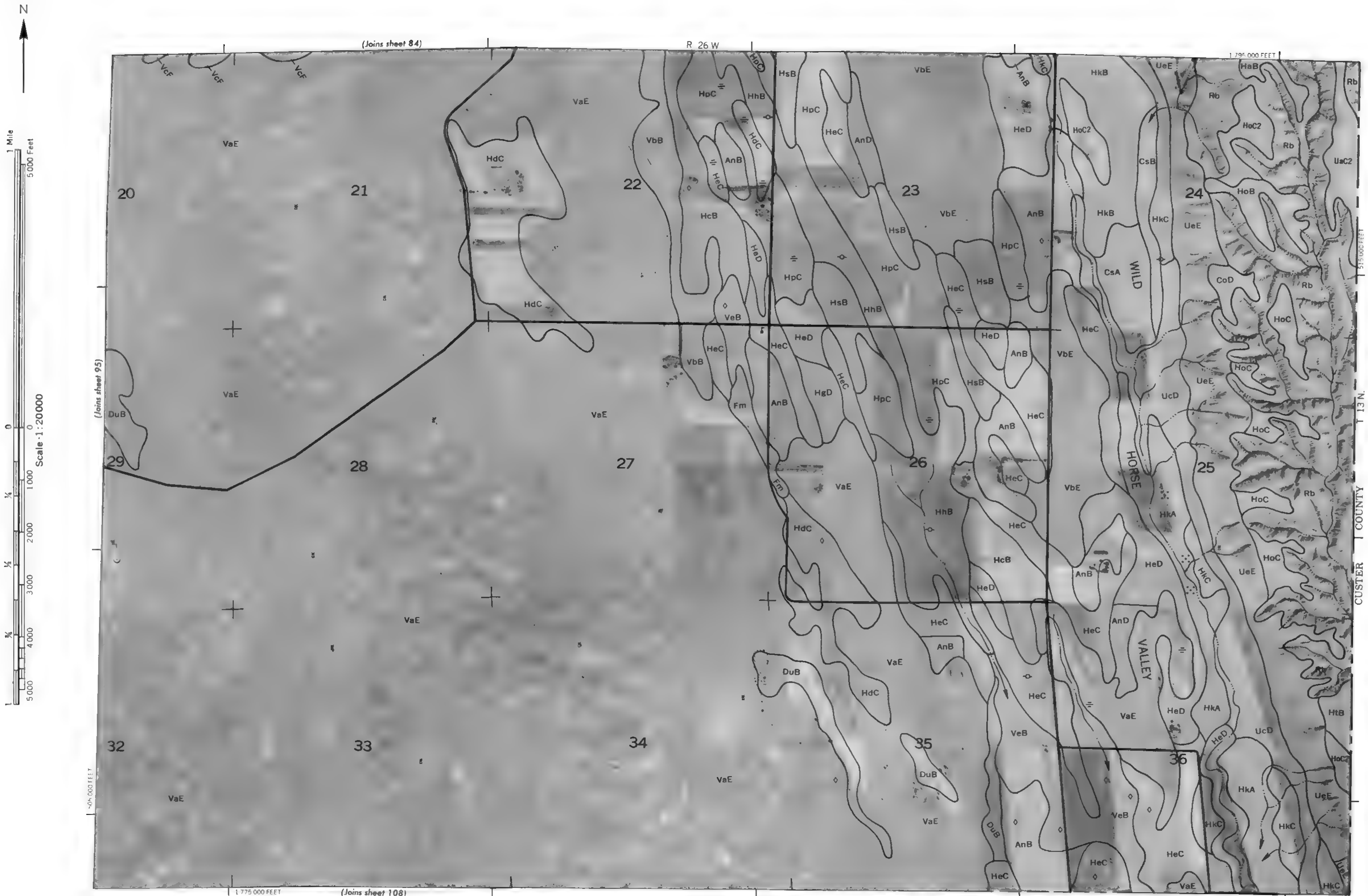


N

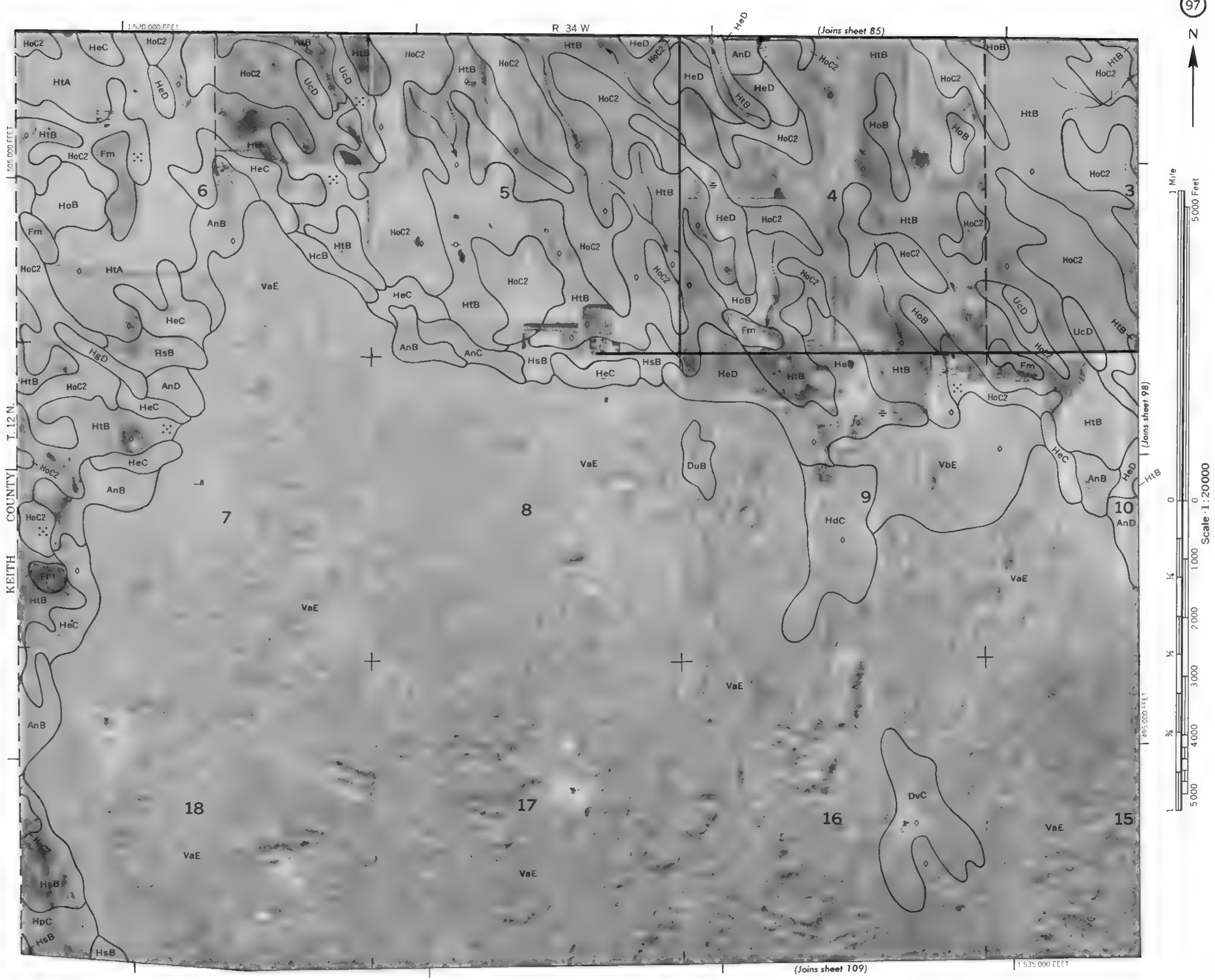
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Scale 1:20000

LINCOLN COUNTY, NEBRASKA NO. 95

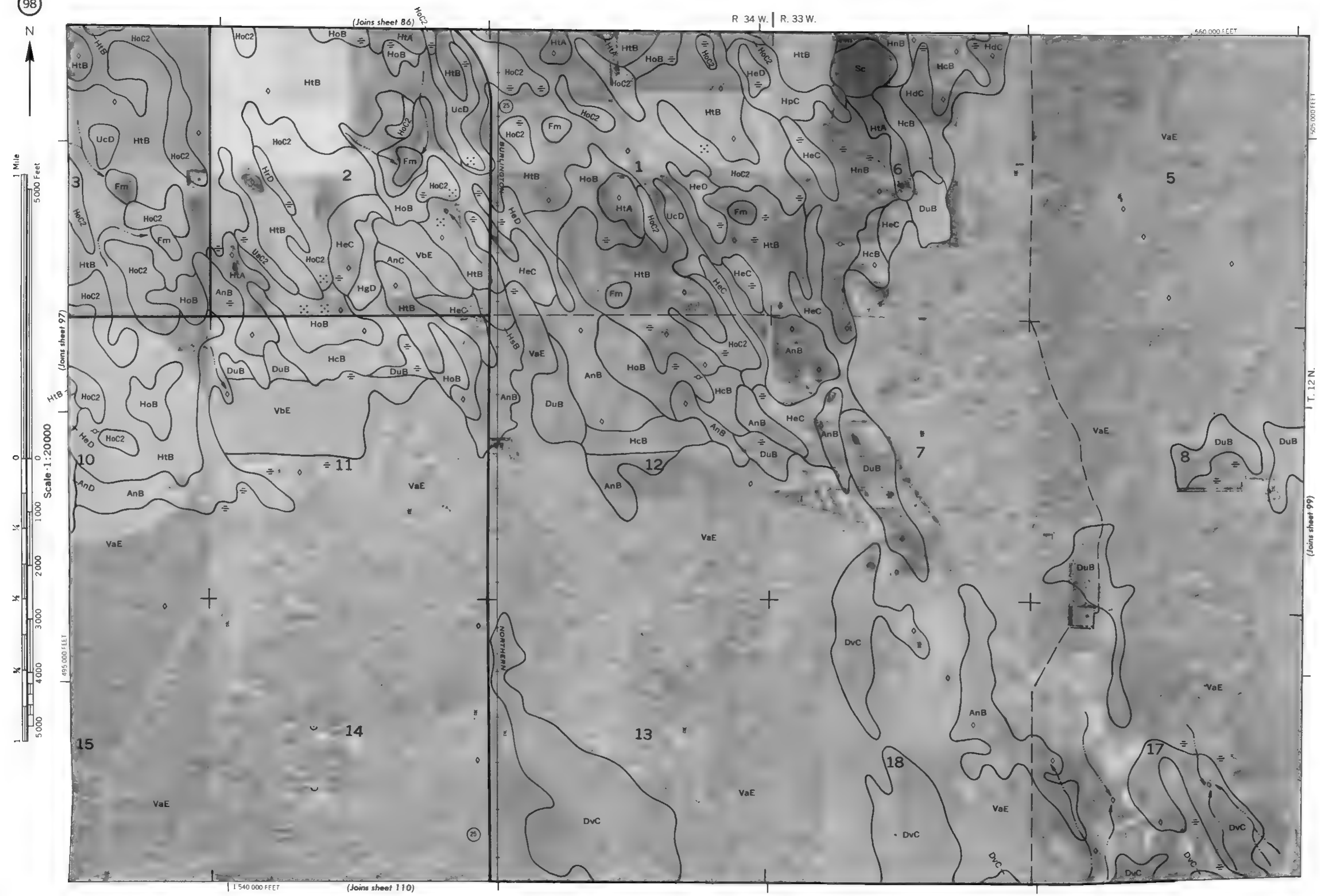
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

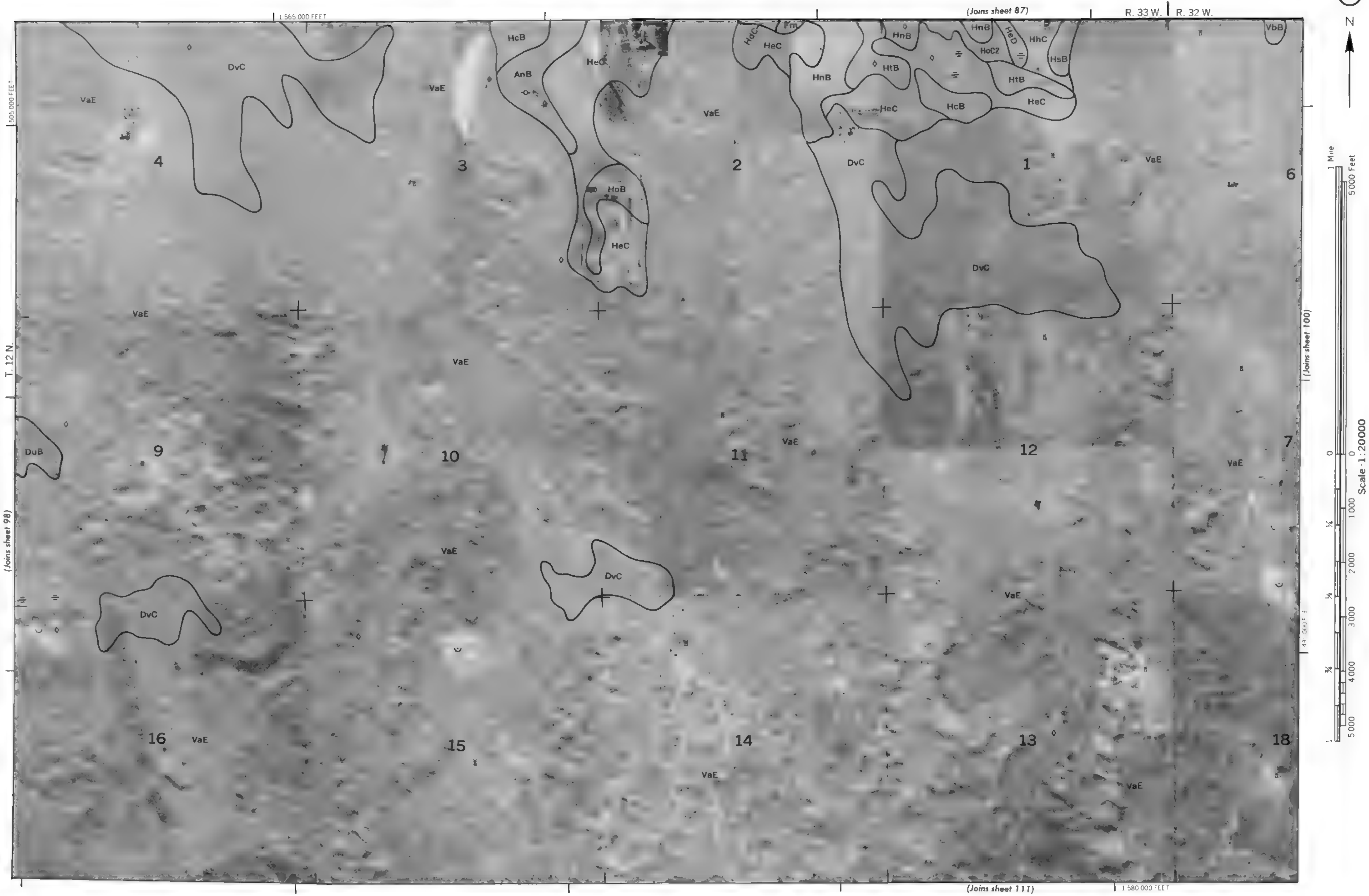


LINCOLN COUNTY, NEBRASKA NO. 97
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



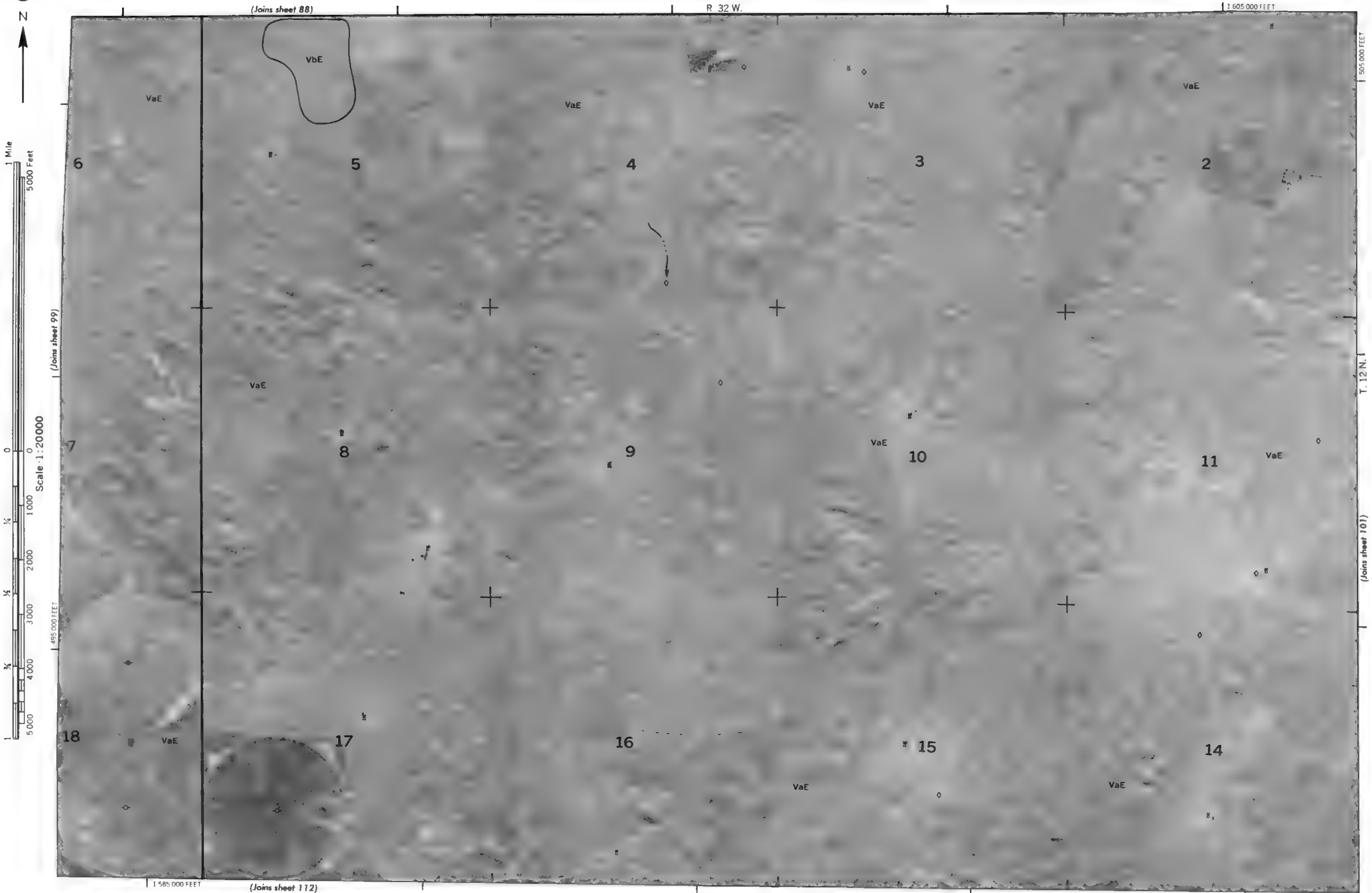
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 98

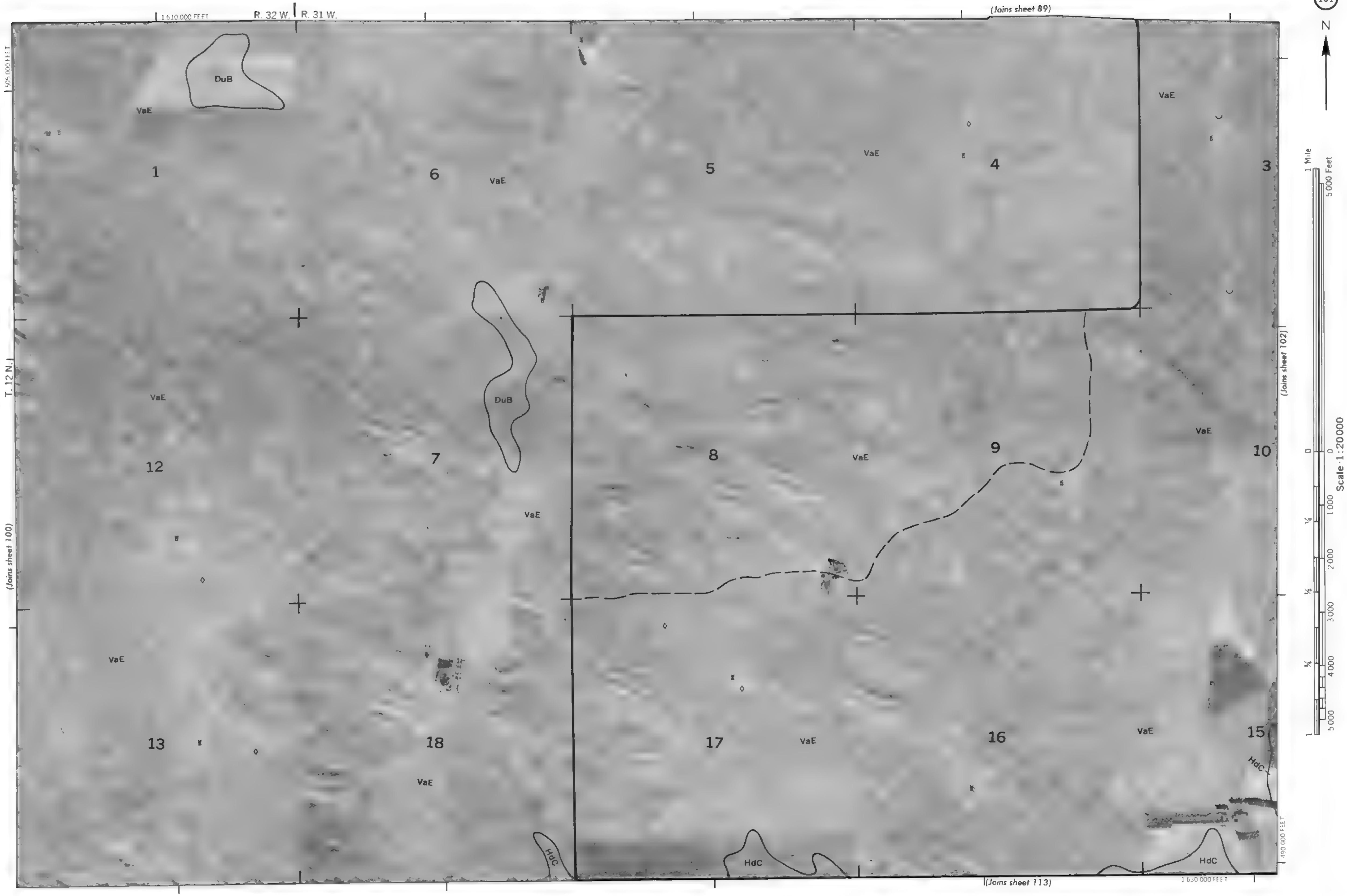


LINCOLN COUNTY, NEBRASKA NO. 99

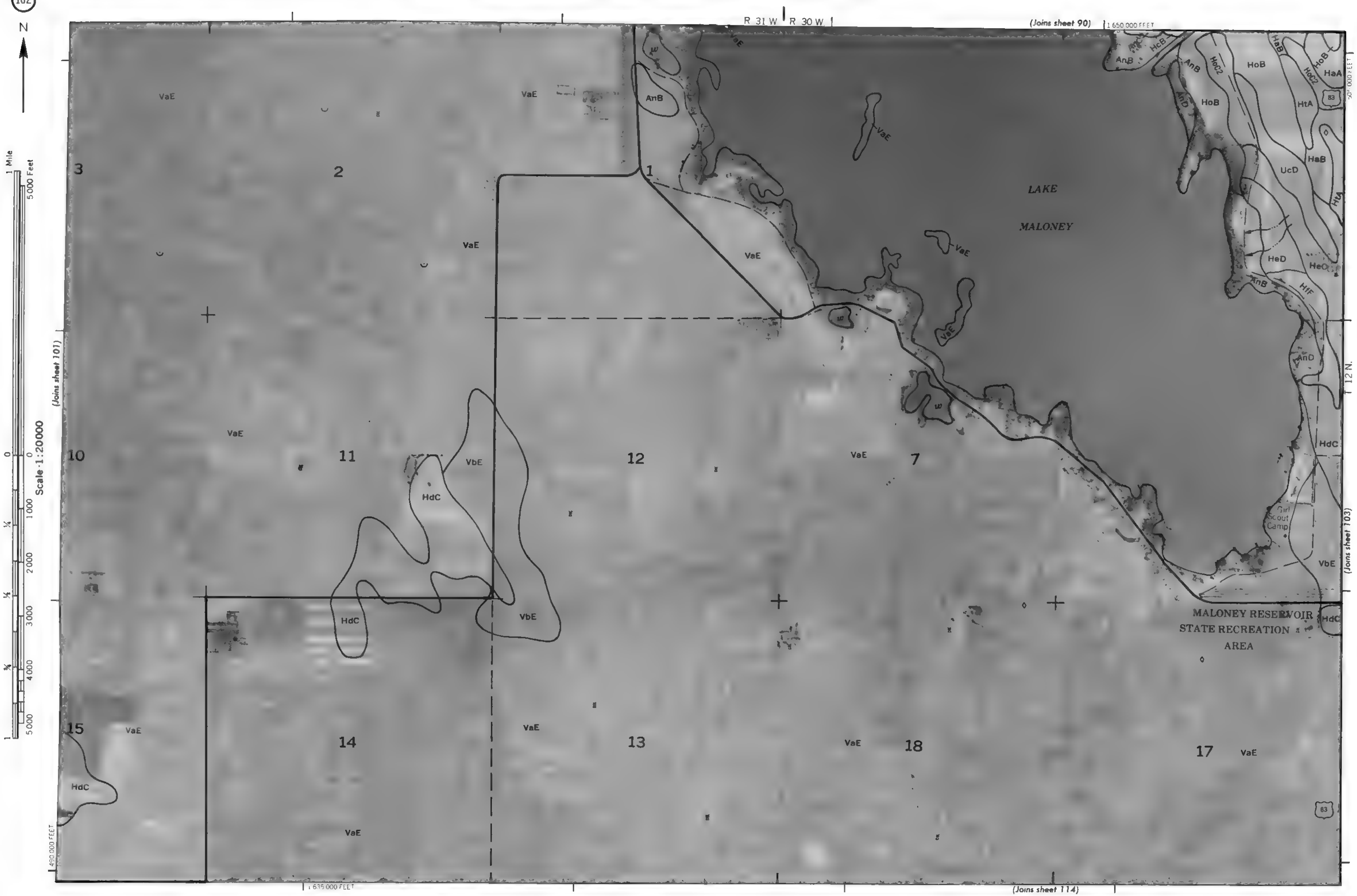
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

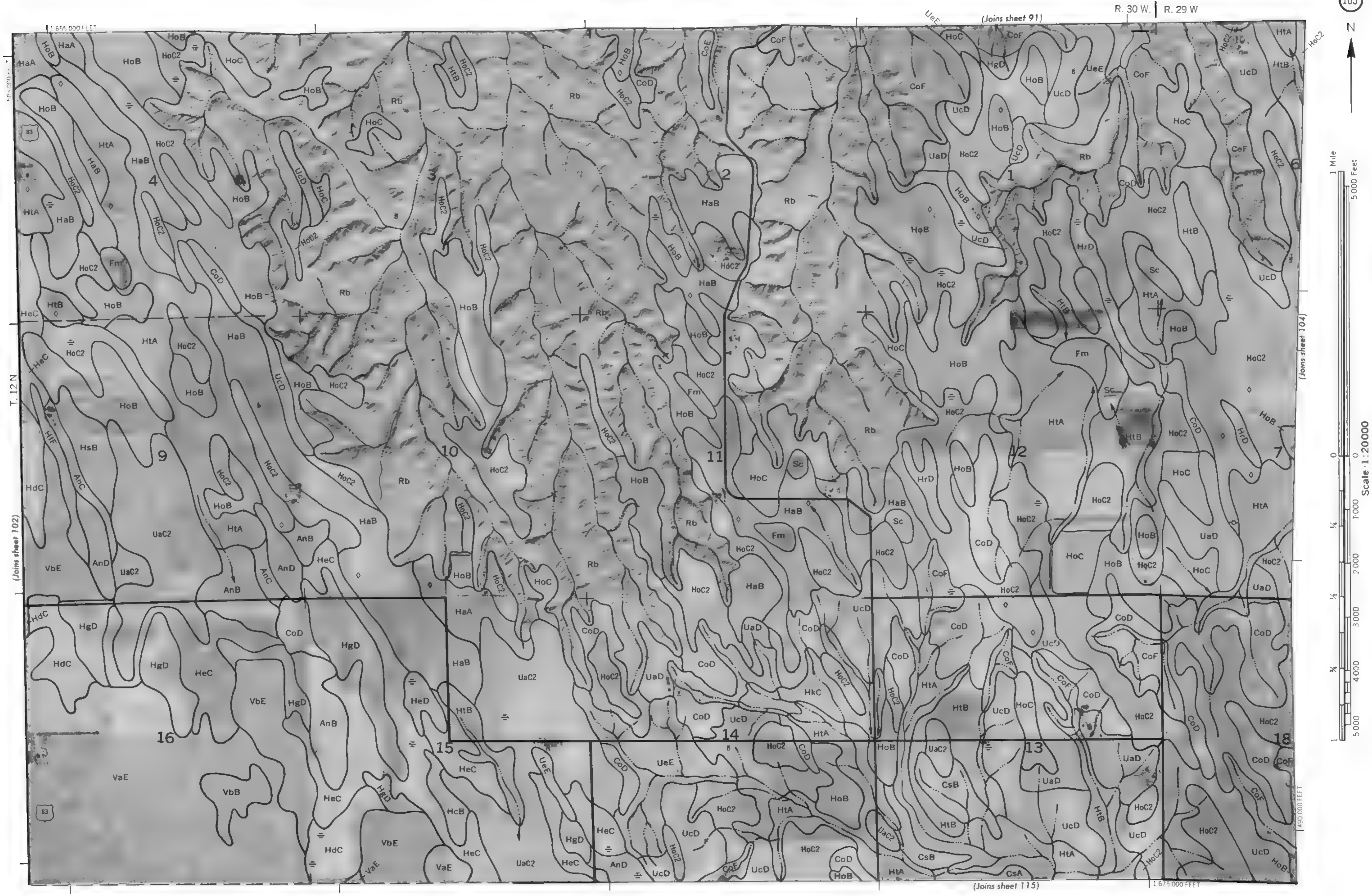


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



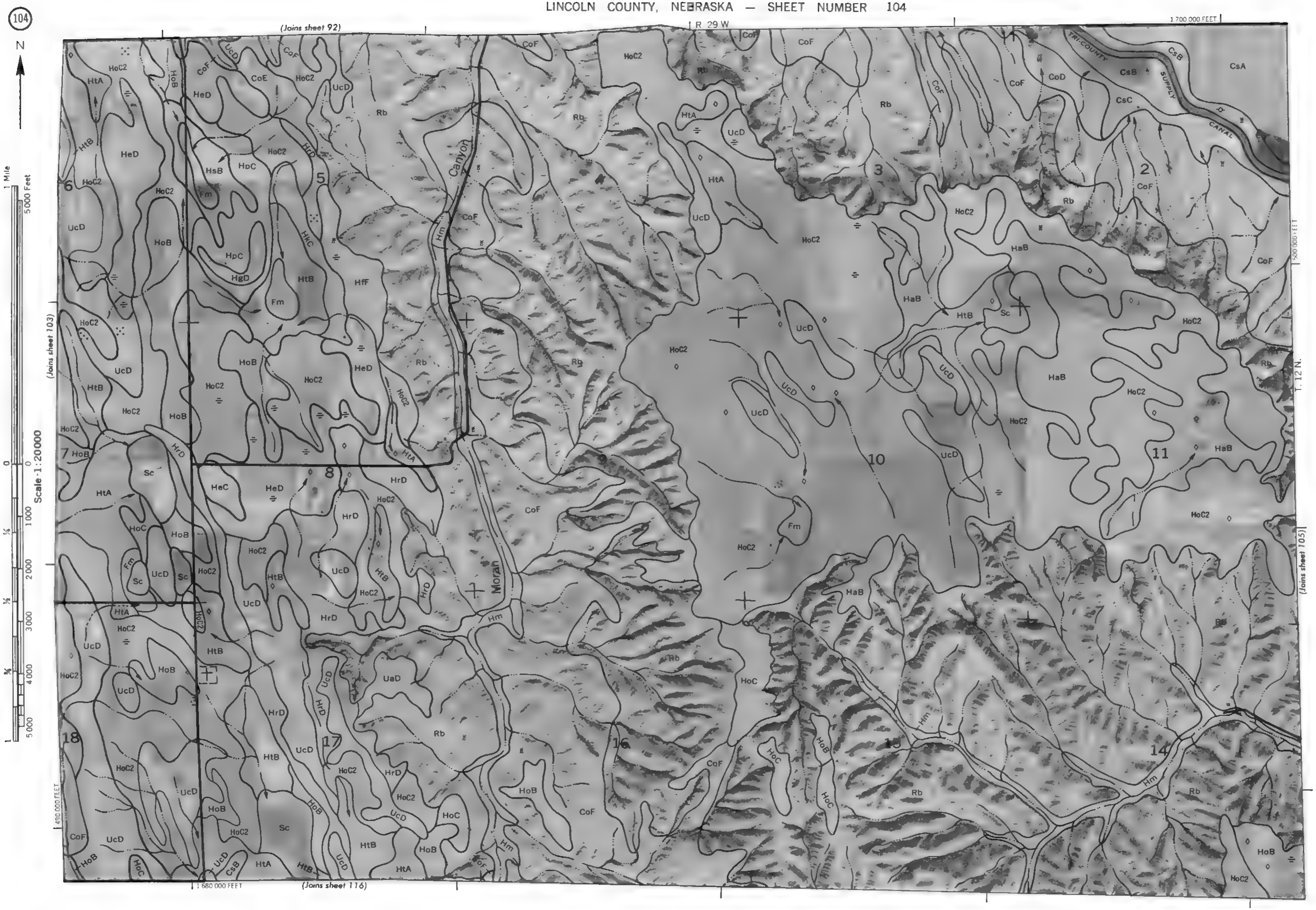
LINCOLN COUNTY, NEBRASKA NO. 101


102
N
1 Mile
5000 Feet
Scale 1:20000
R 31 W
R 30 W
(Joins sheet 90)
(Joins sheet 101)
(Joins sheet 103)
(Joins sheet 114)
12 N.
LAKE
MALONEY
MALONEY RESERVOIR
STATE RECREATION
AREA
Girl
Scout
Camp
VaE
VbE
HdC
AnB
AnD
HoB
HaB
HaA
HtA
UcD
HeD
HeC
HtF
W
83
1
2
3
7
10
11
12
13
14
15
17
18

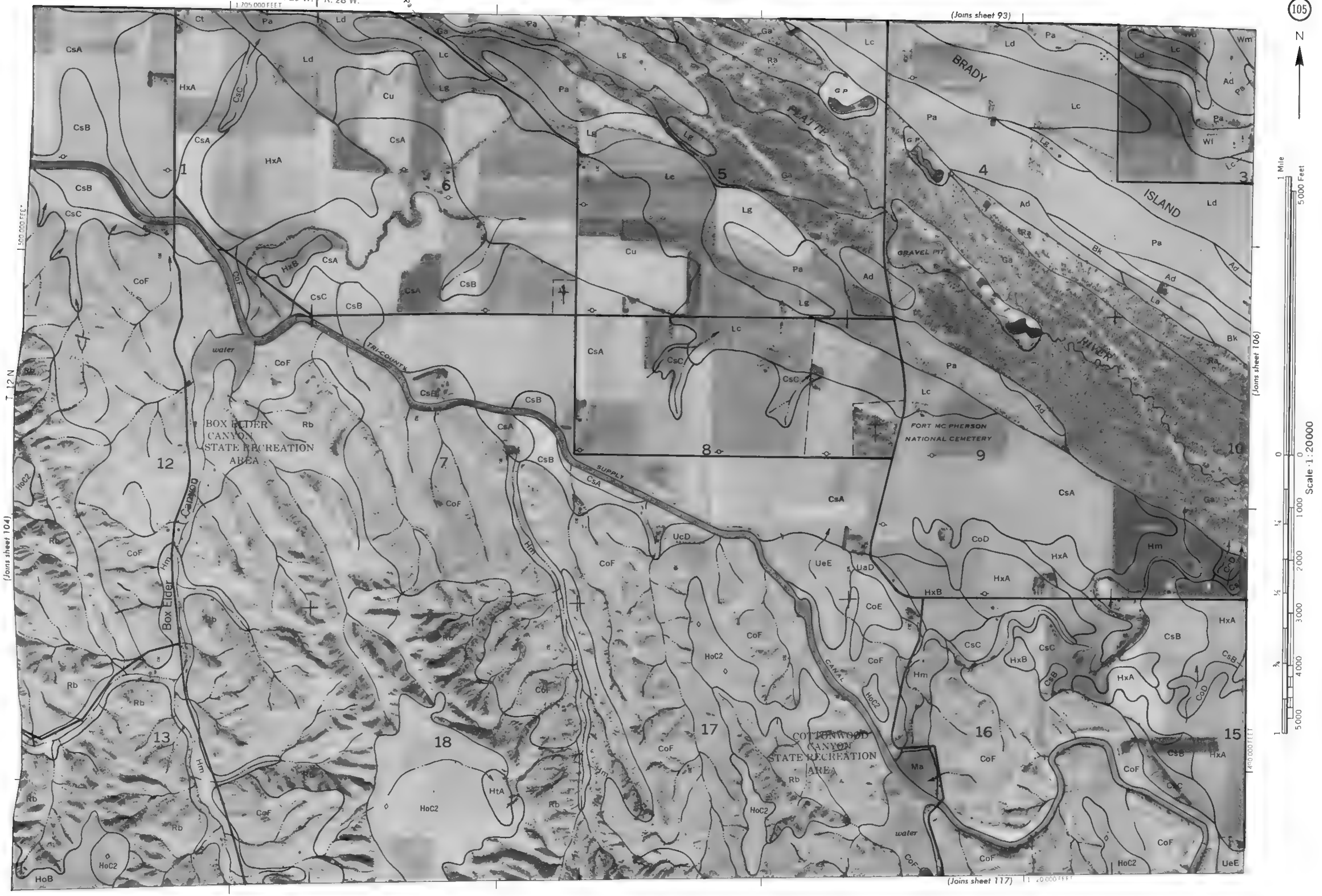


LINCOLN COUNTY, NEBRASKA NO. 103

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

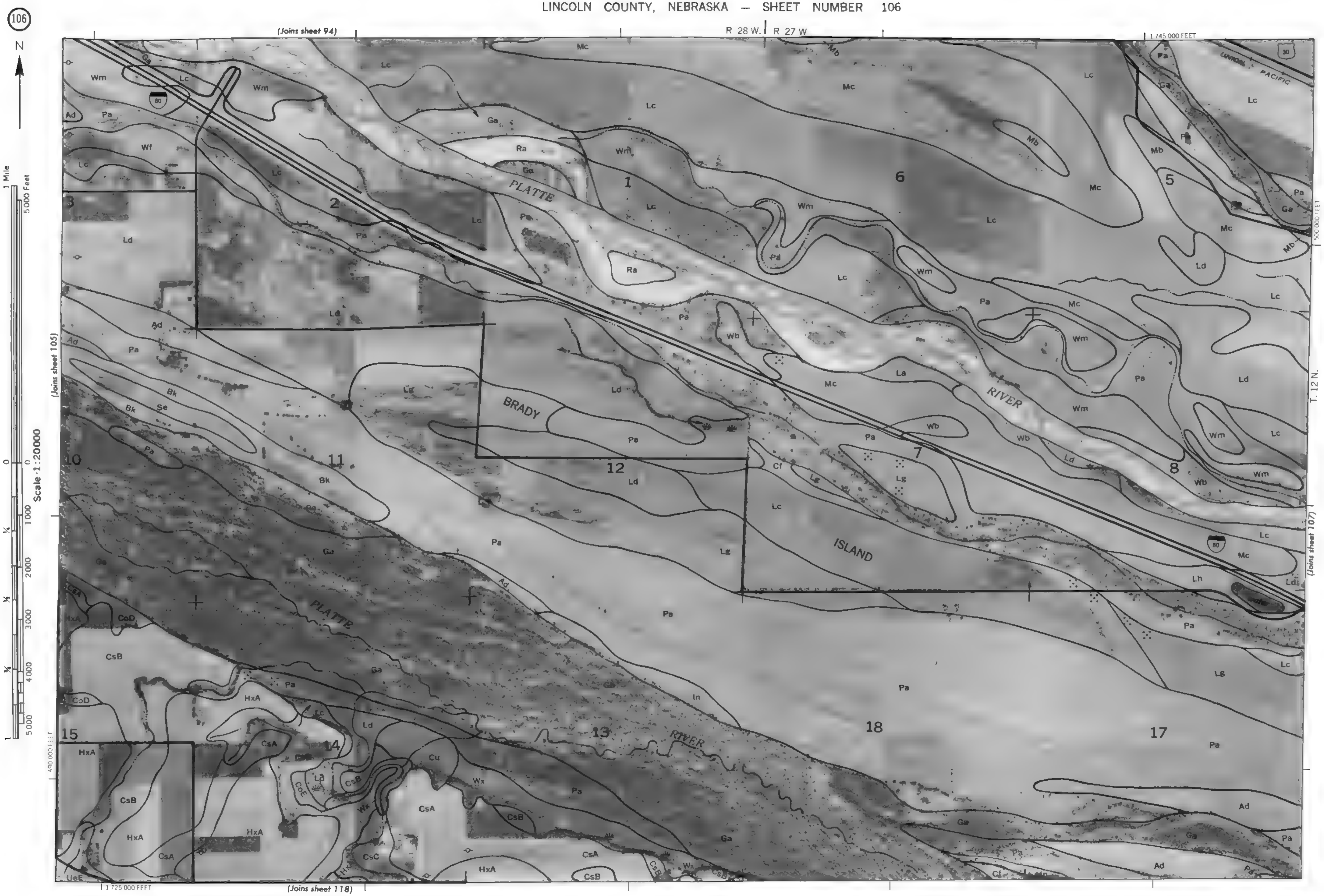


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

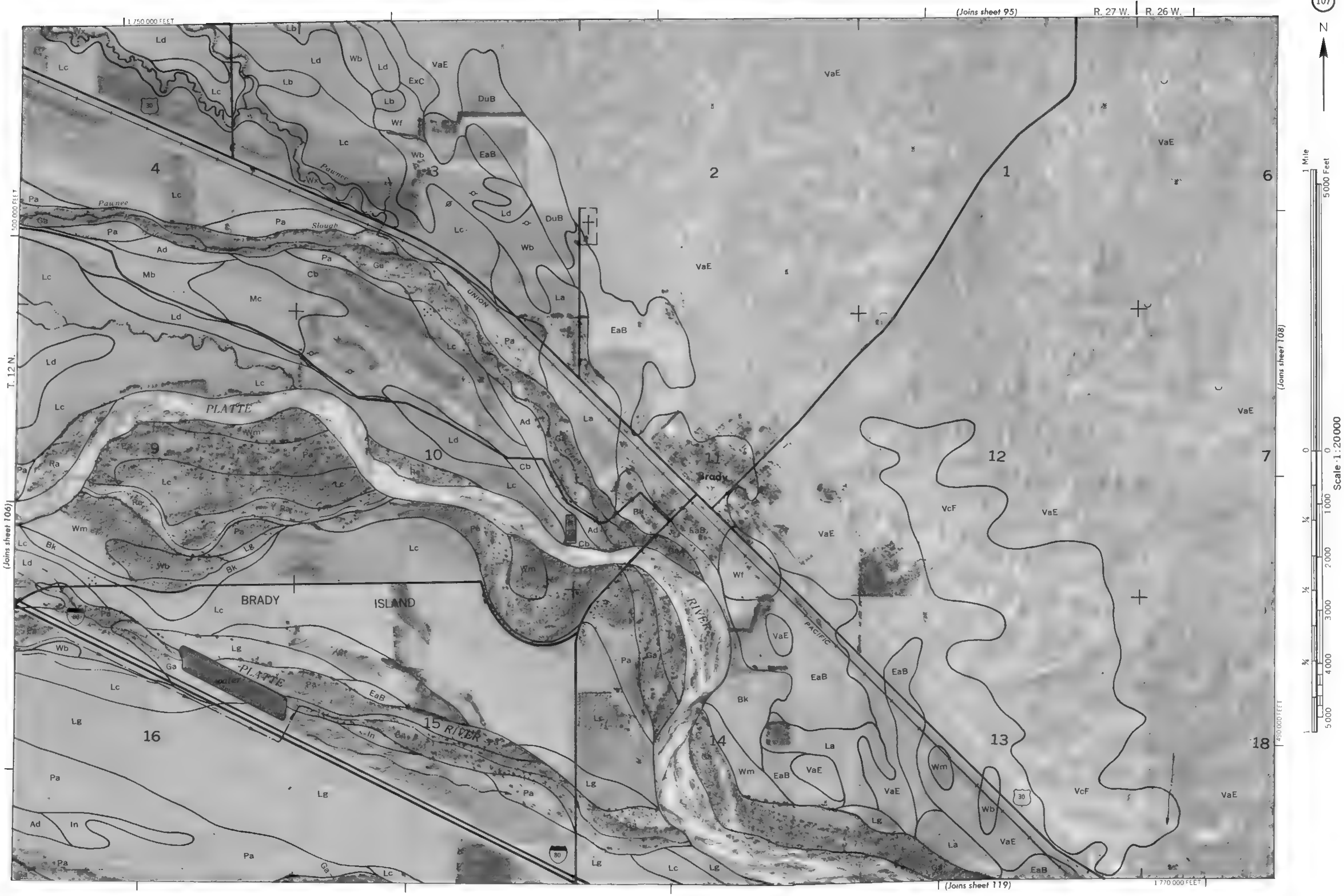


LINCOLN COUNTY, NEBRASKA NO. 105

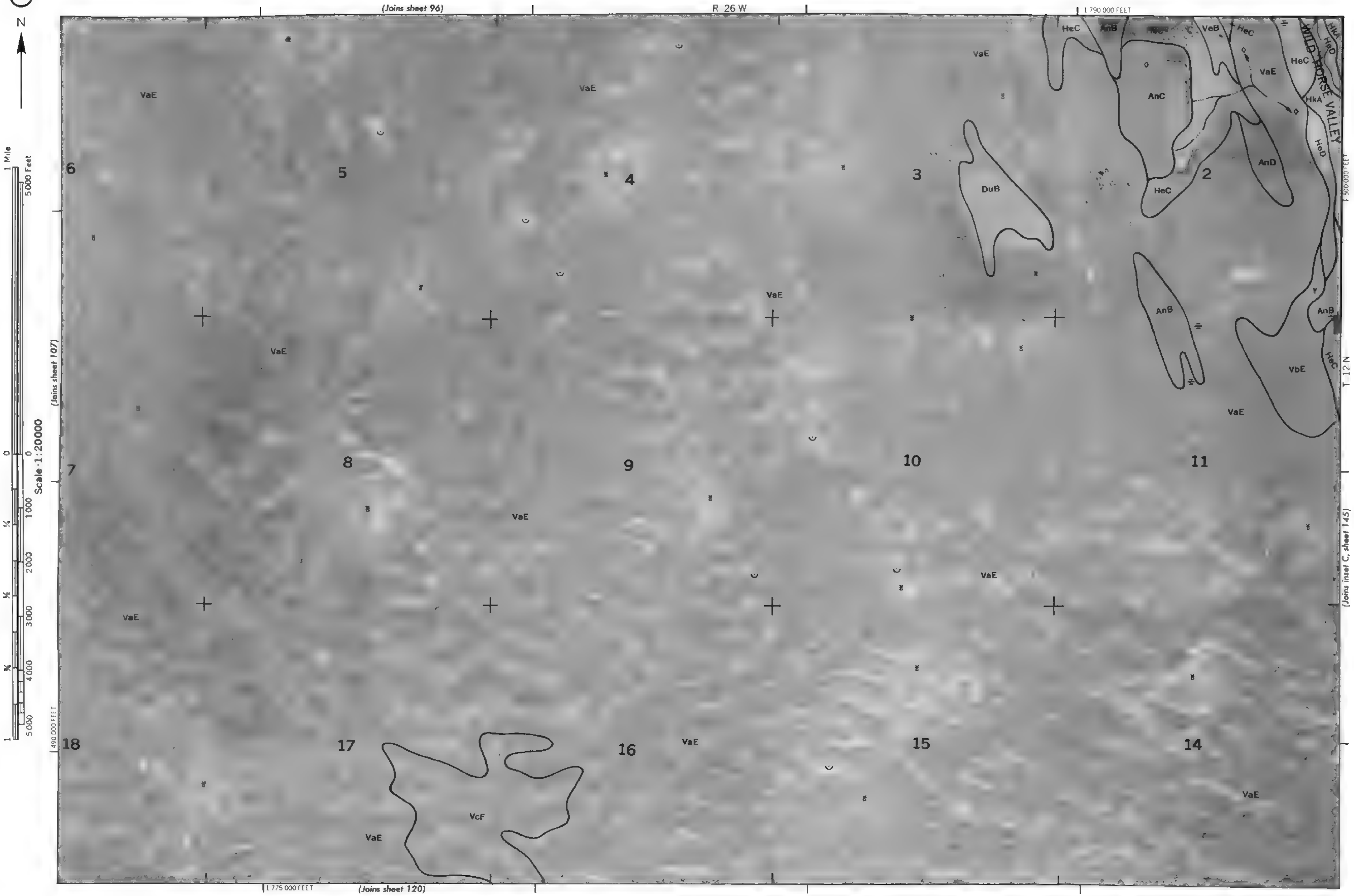
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



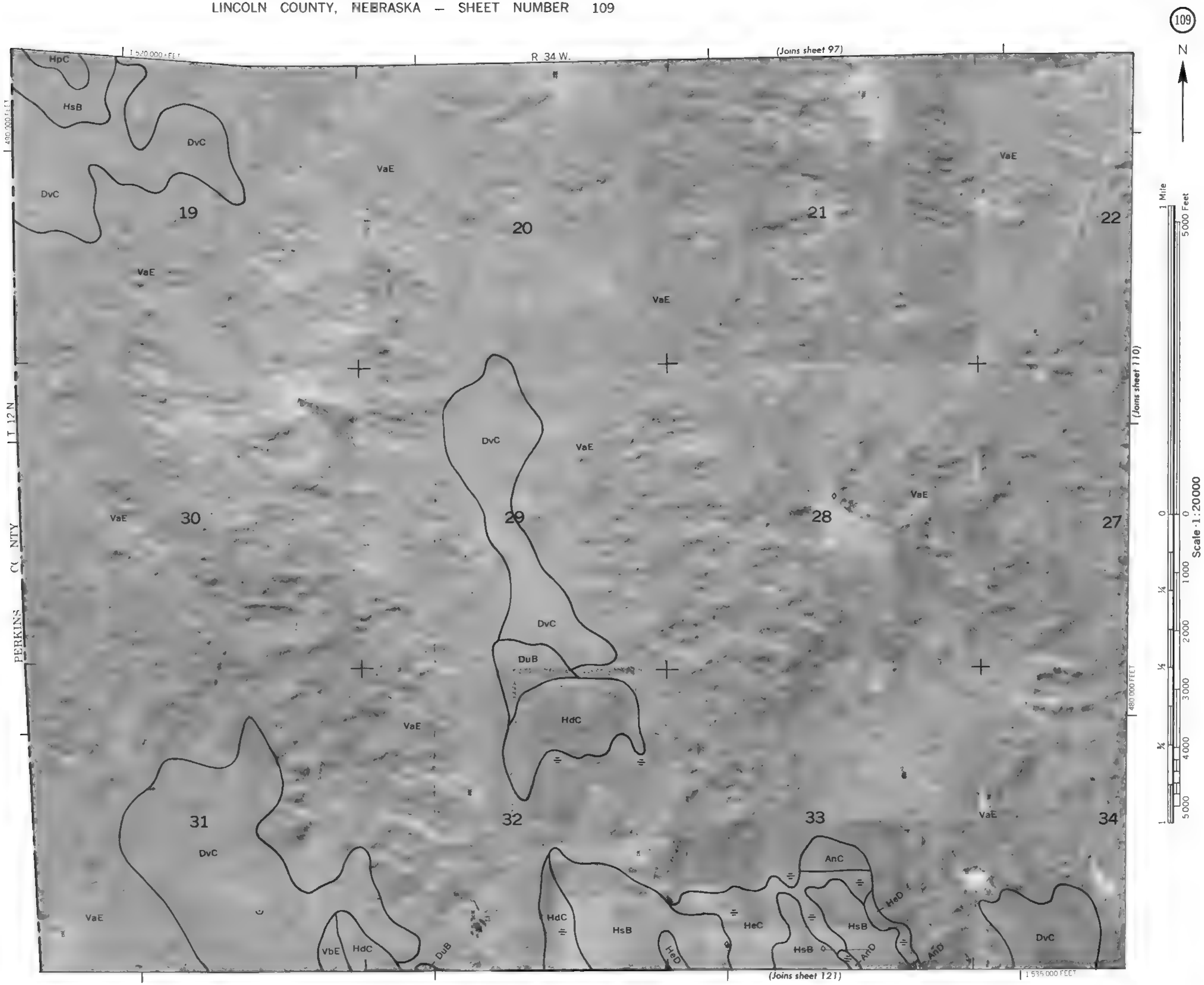
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LINCOLN COUNTY, NEBRASKA NO. 107

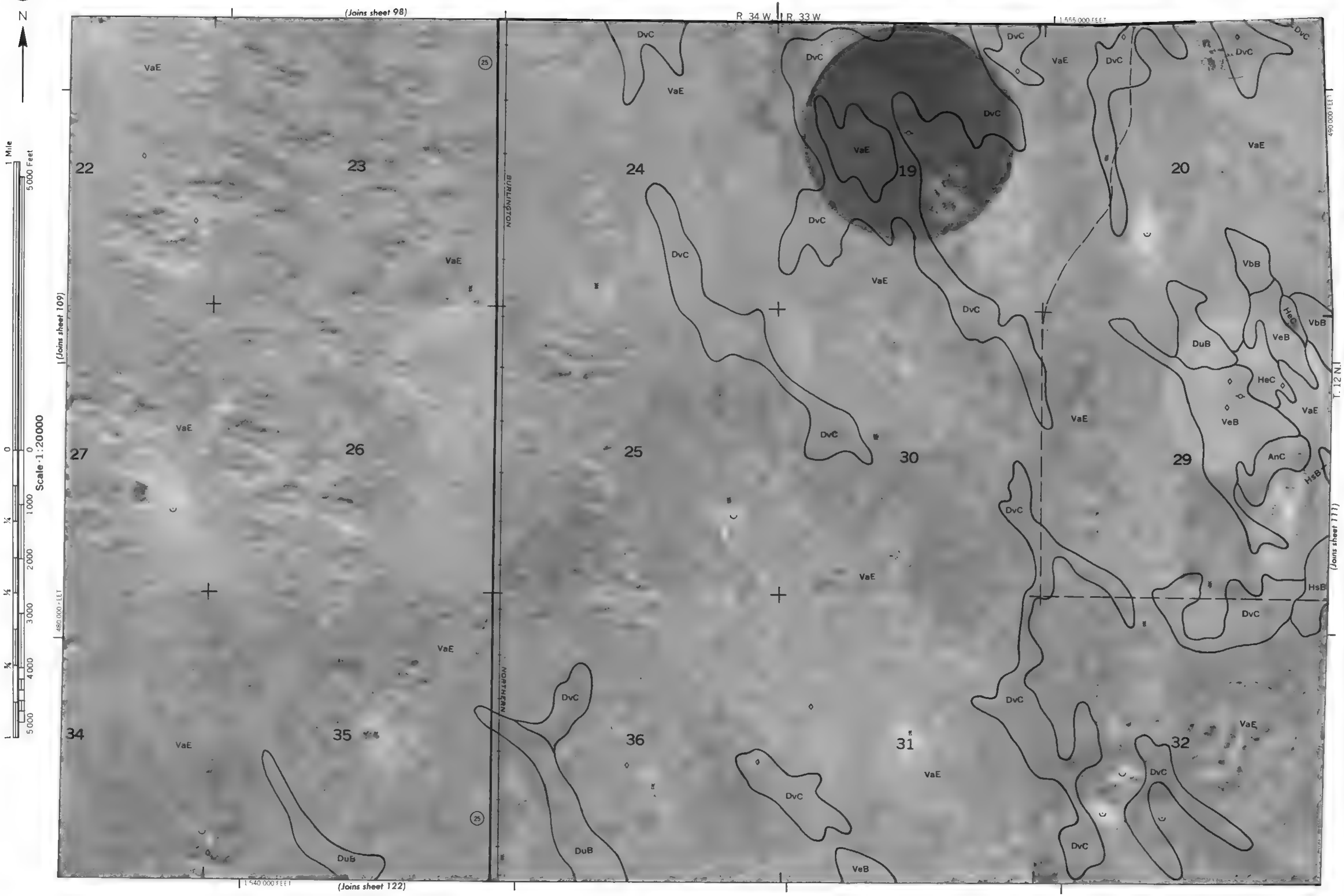


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned



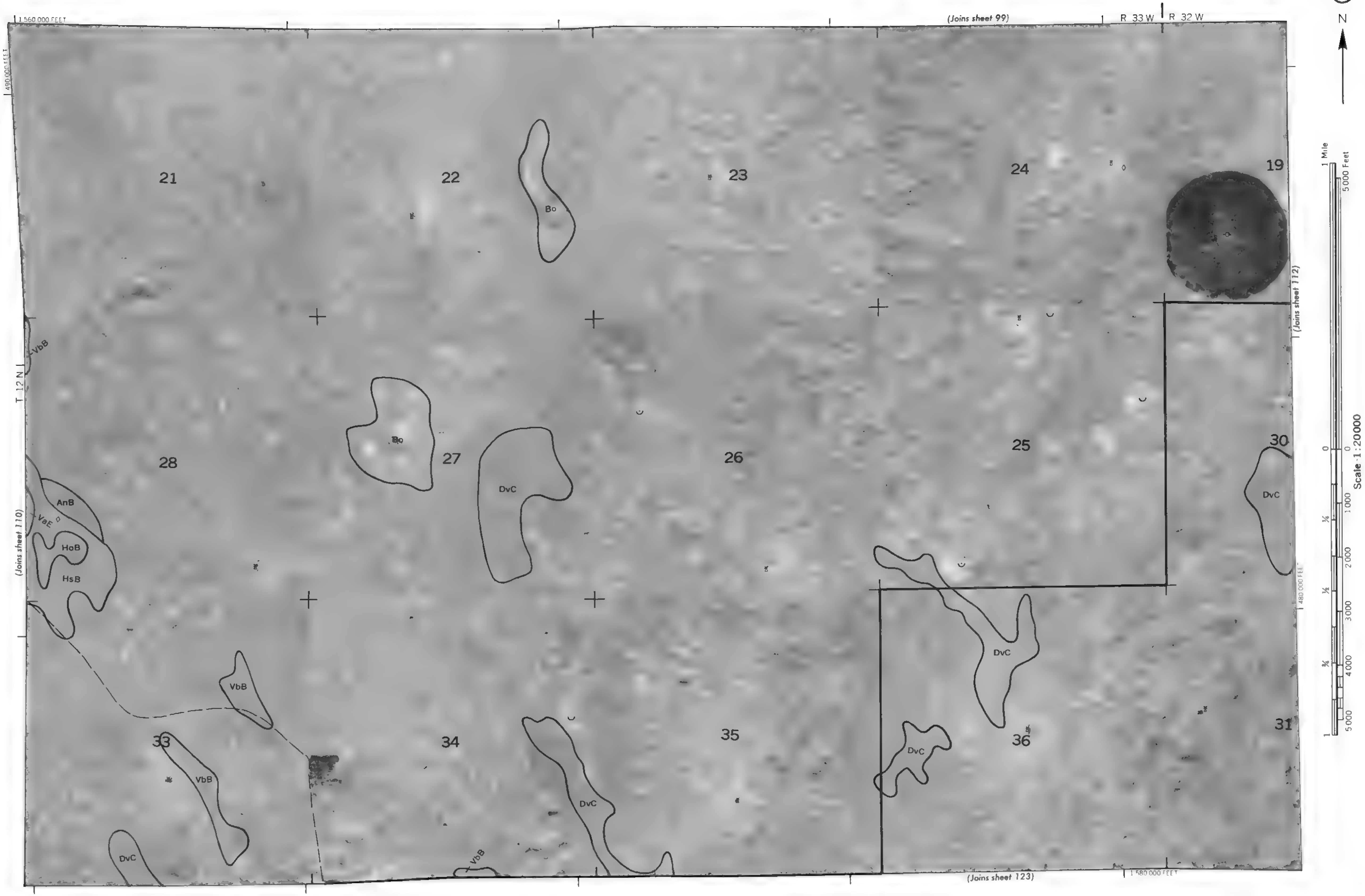
LINCOLN COUNTY, NEBRASKA NO. 109

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

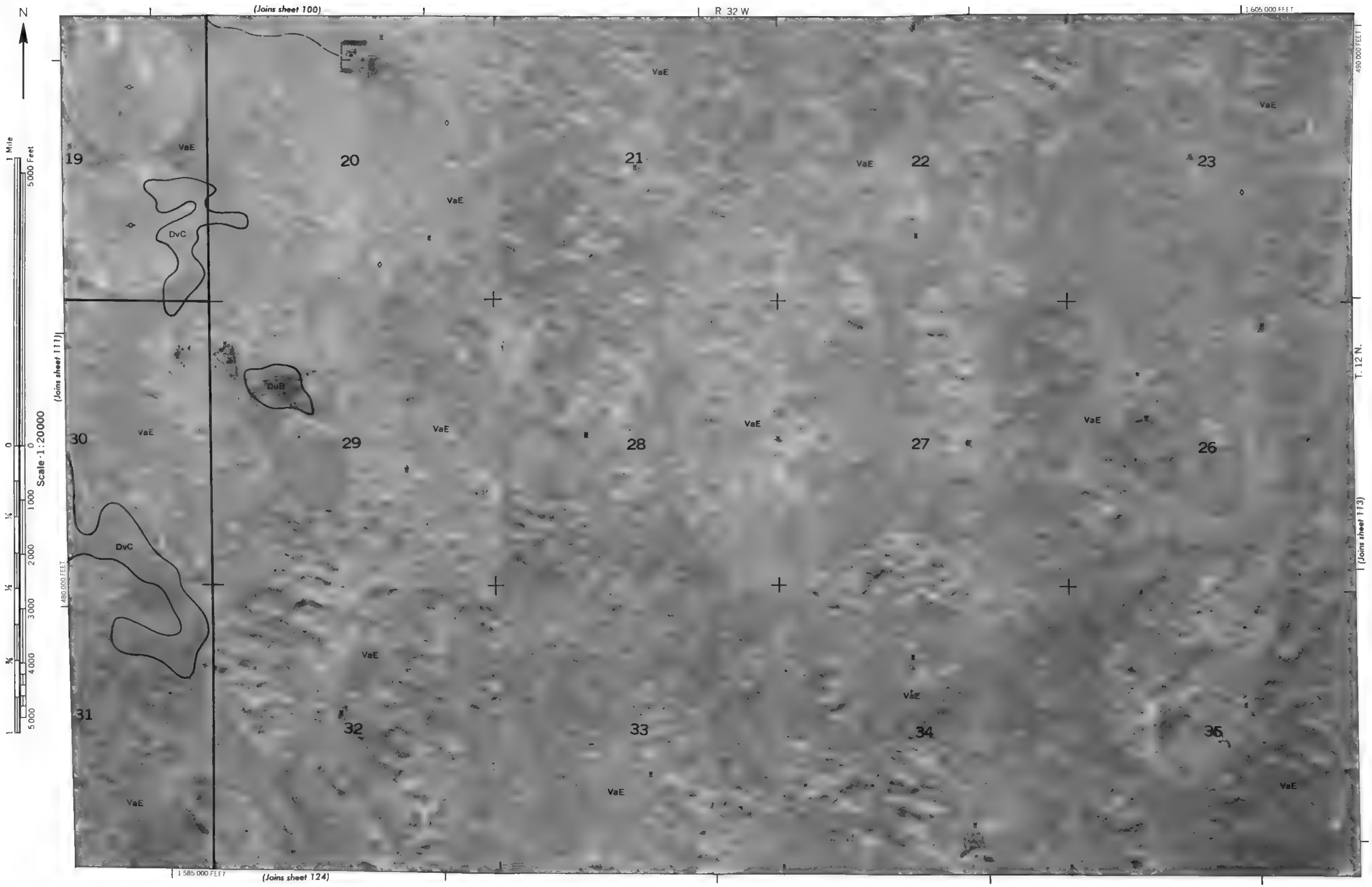


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY, NEBRASKA NO. 110

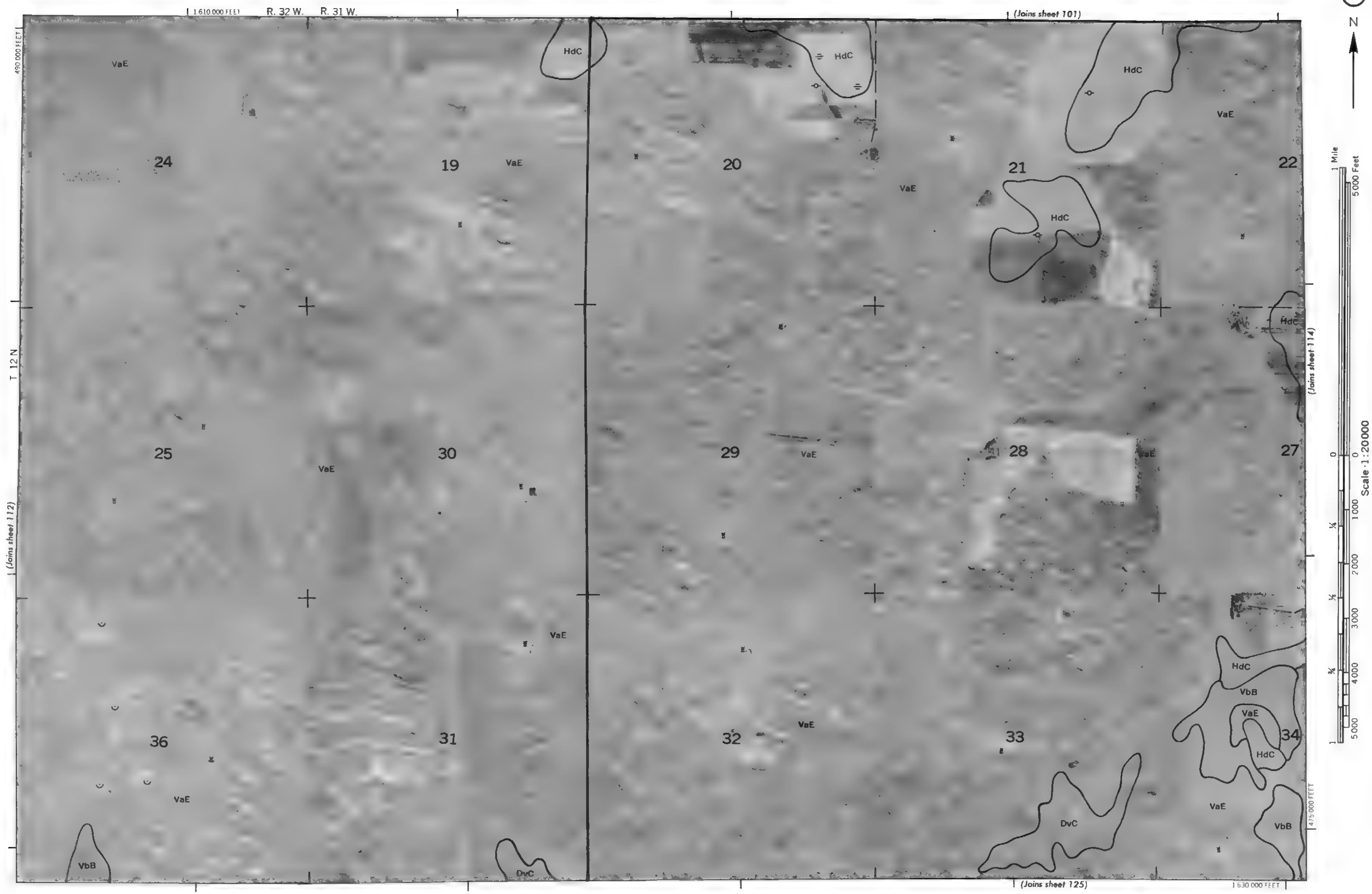


LINCOLN COUNTY, NEBRASKA NO. 111
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies



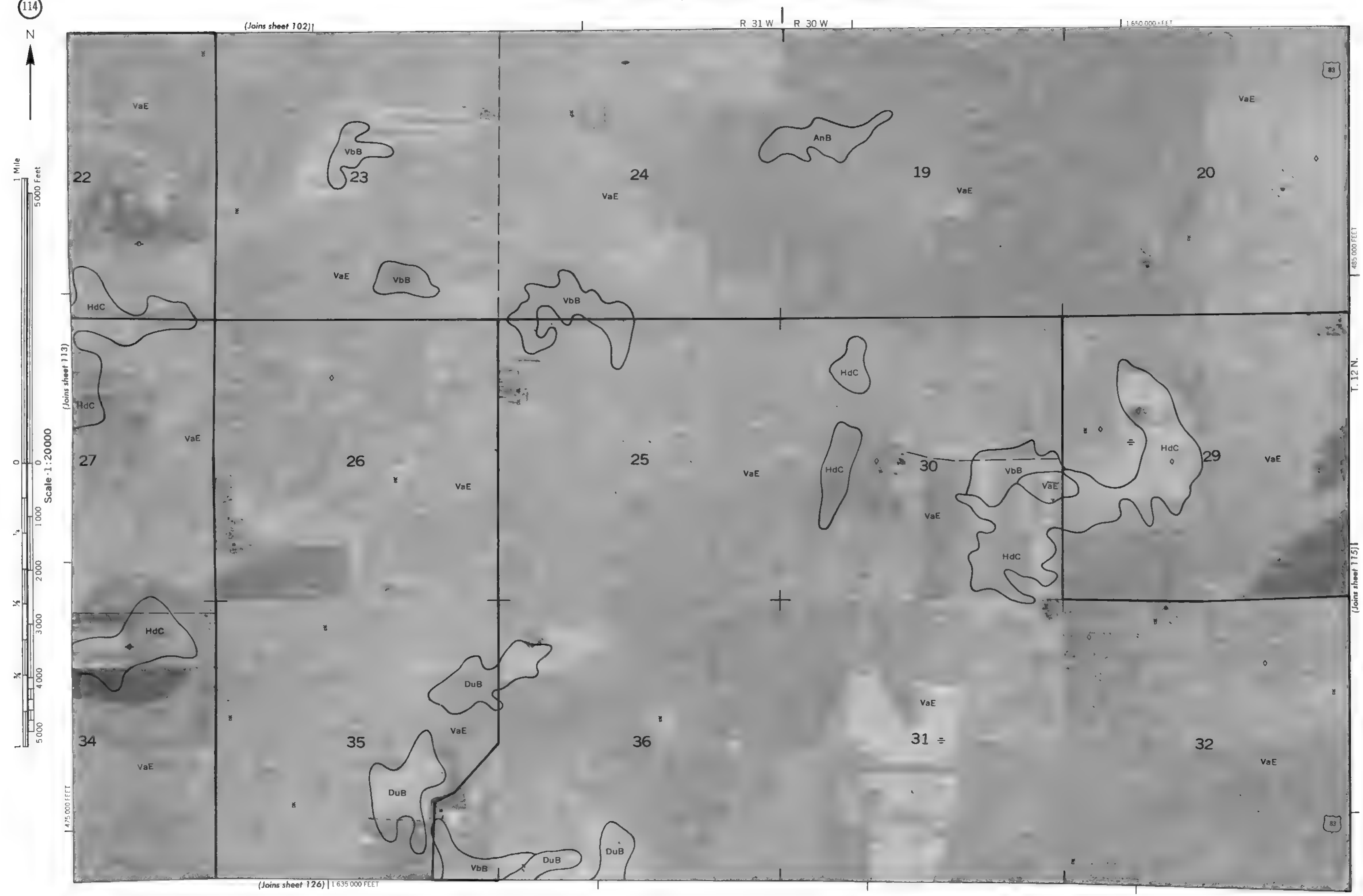
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 112



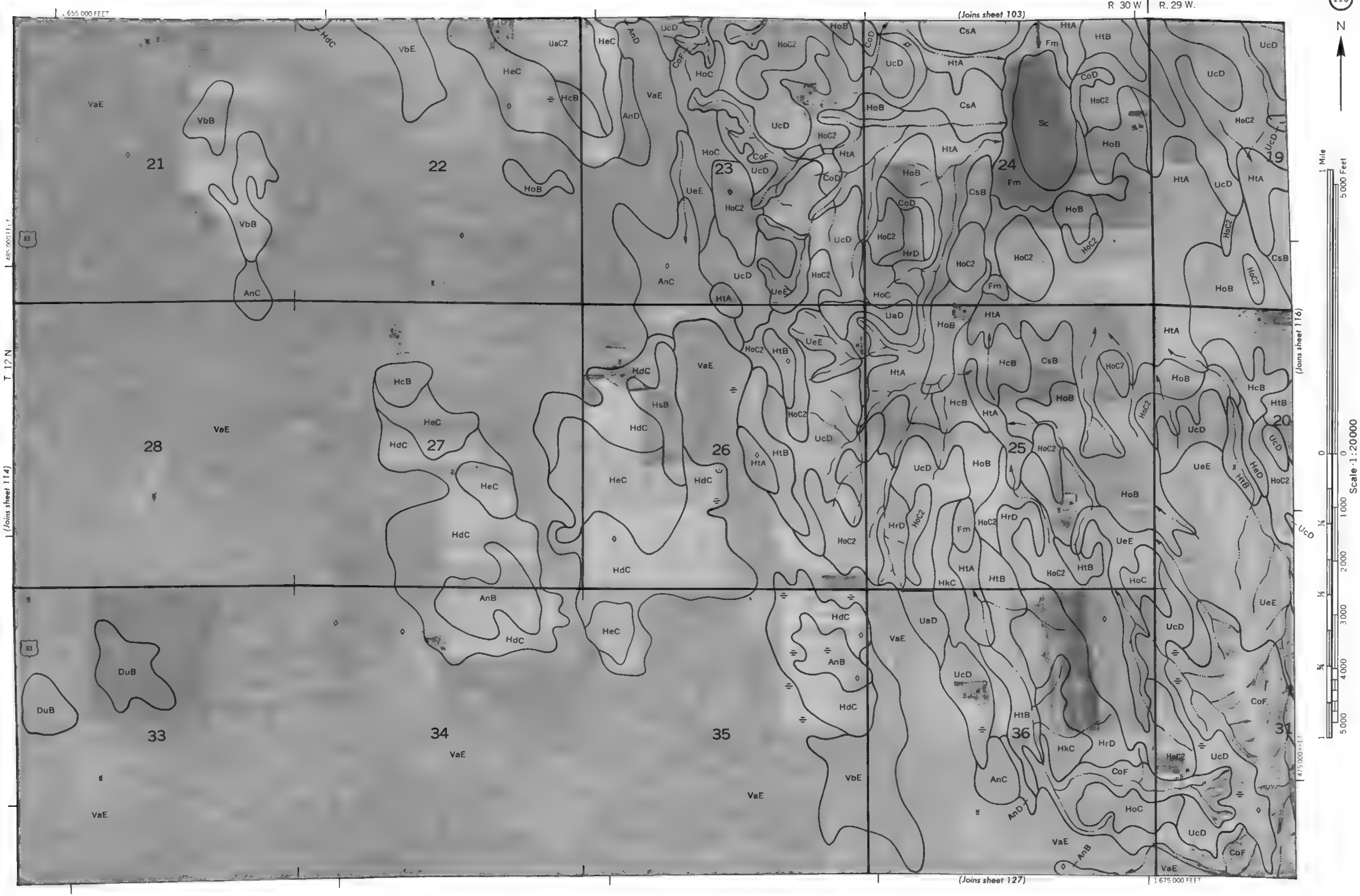
LINCOLN COUNTY, NEBRASKA NO. 113

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



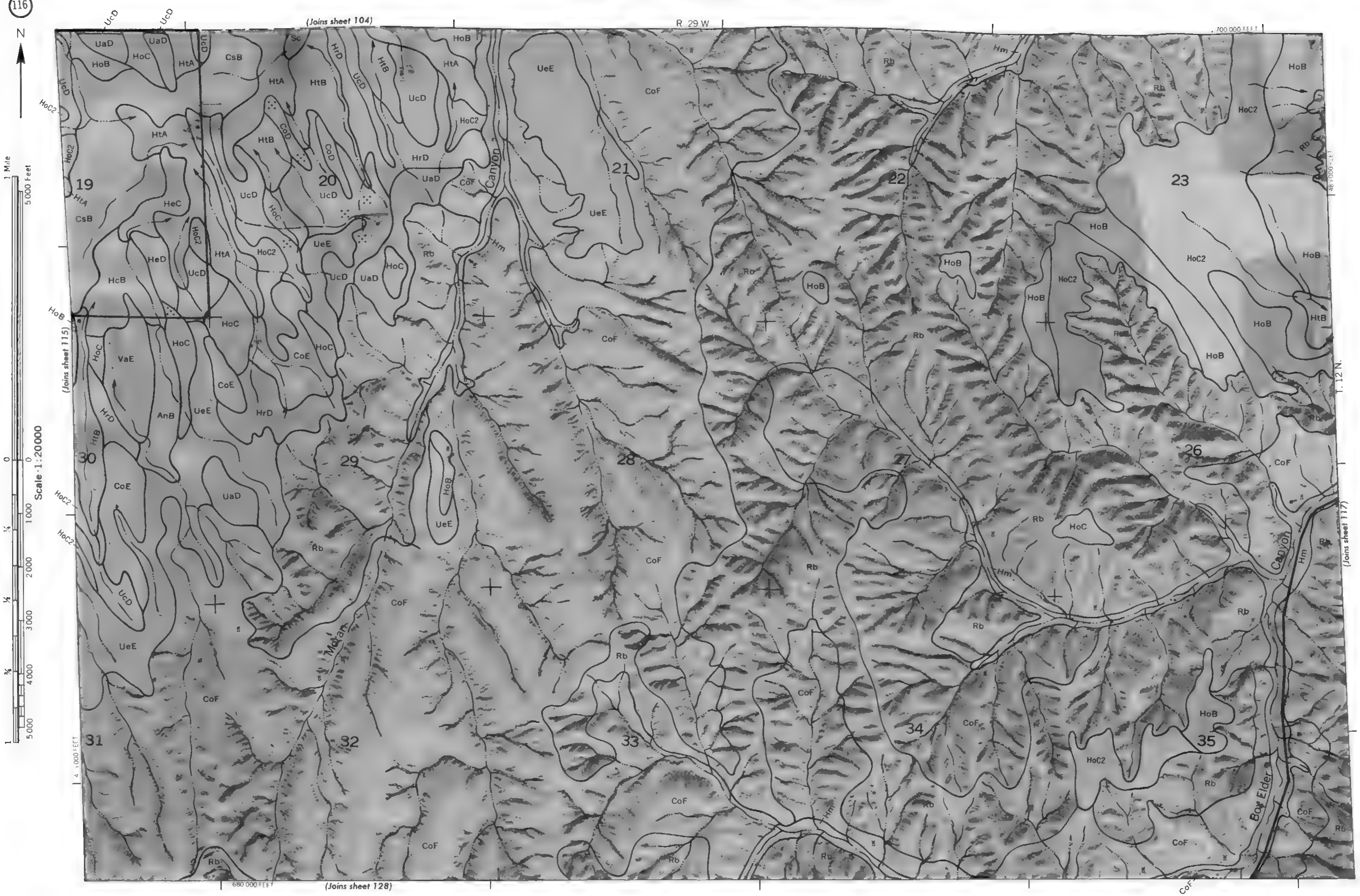
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(115)



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

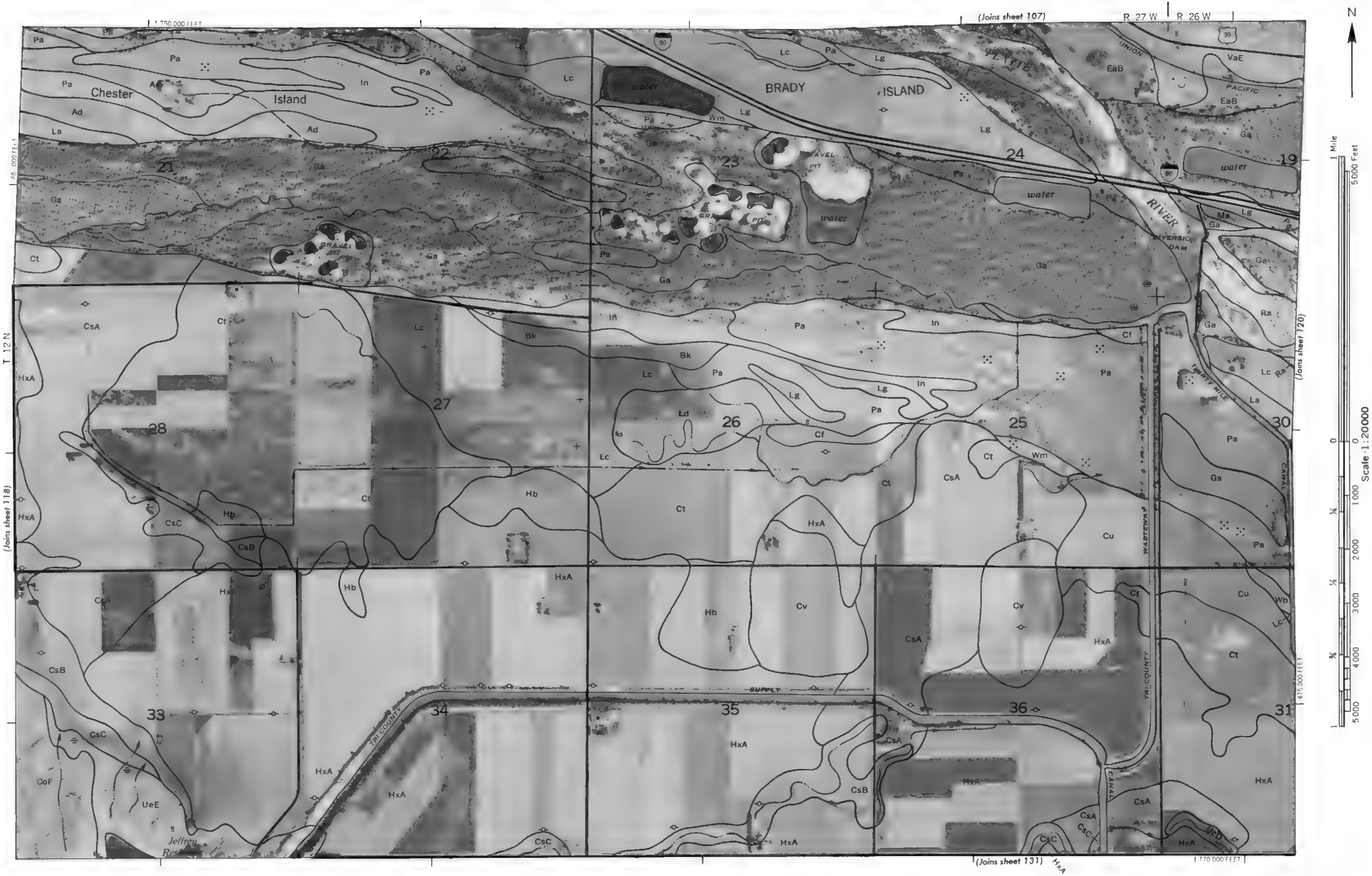
LINCOLN COUNTY, NEBRASKA NO. 115


116
N
(Joins sheet 104)
R. 29 W.
700 000 FEET
(Joins sheet 115)
(Joins sheet 117)
(Joins sheet 128)
680 000 FEET
T. 12 N.
Scale 1:20000
1 Mile
5000 Feet
Canyon
Moran
Box Elder
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
UaD
UcD
HoB
HoC
HtA
CsB
Sc
HtB
HrD
UeE
CoF
HoC2
CoD
HeC
HeD
HcB
UaD
HoB
Rb
Hm
VaE
AnB
CoE
HtB
HrD
HoC

LINCOLN COUNTY, NEBRASKA NO. 117

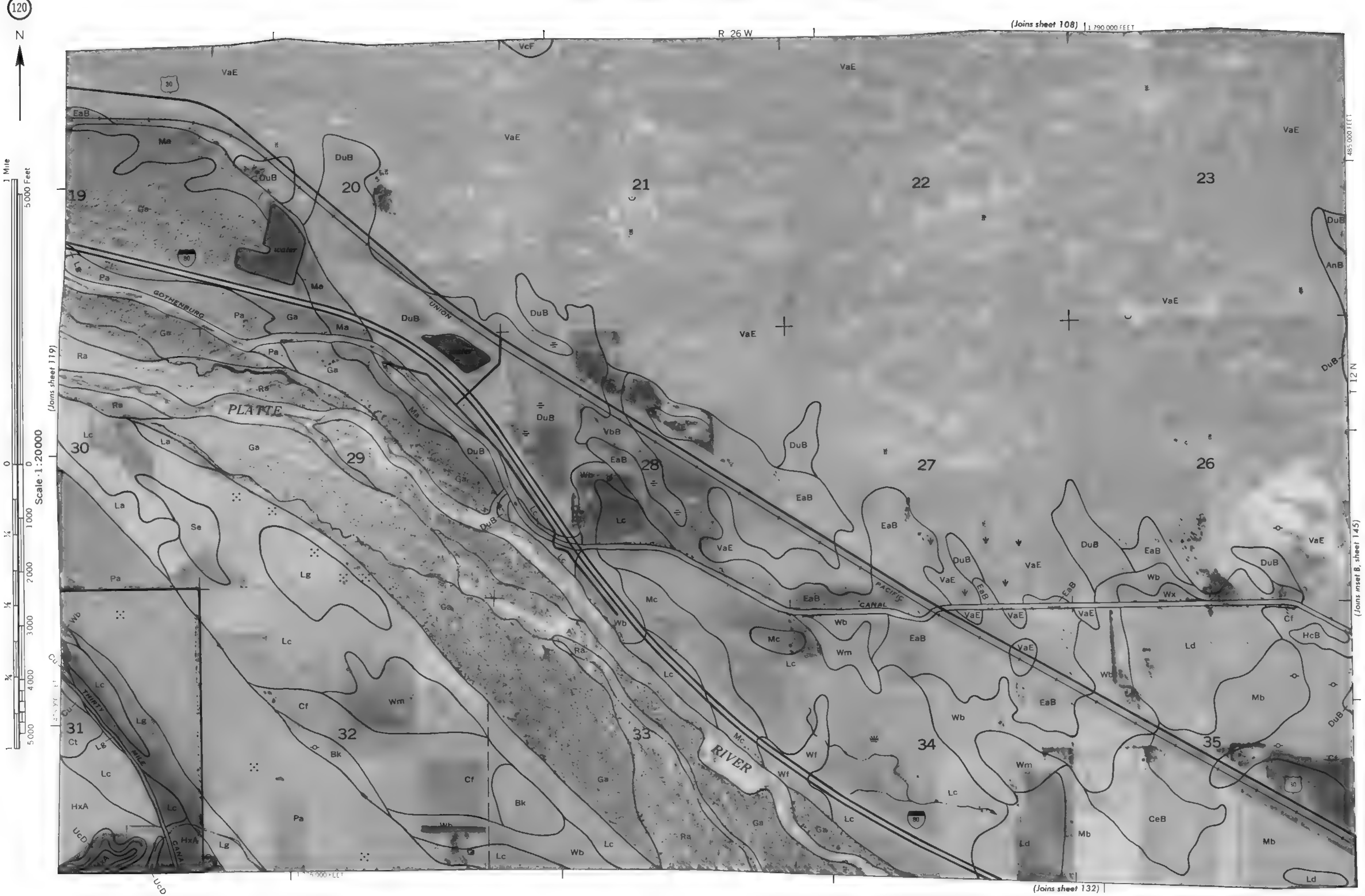
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.



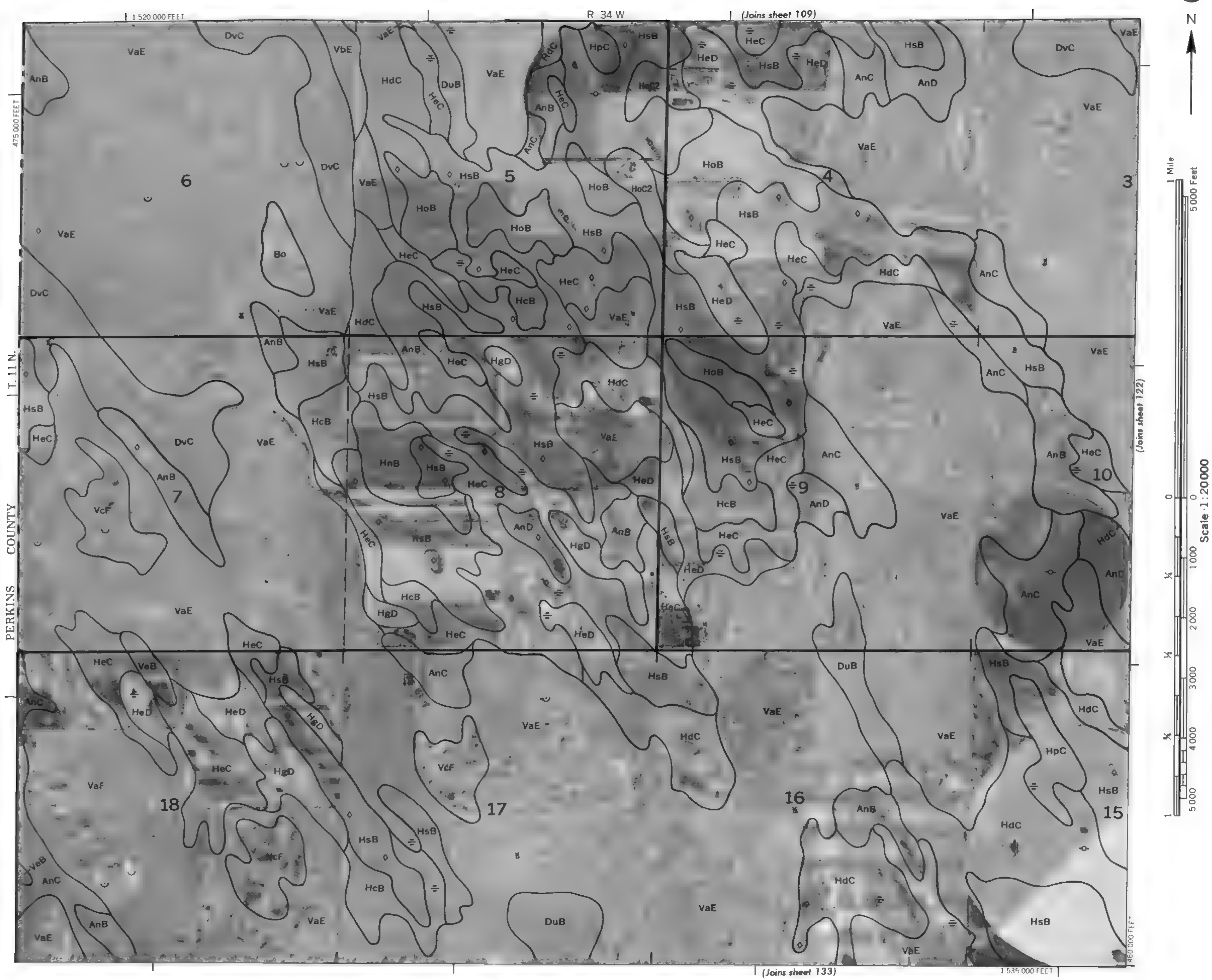
LINCOLN COUNTY, NEBRASKA NO. 119

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

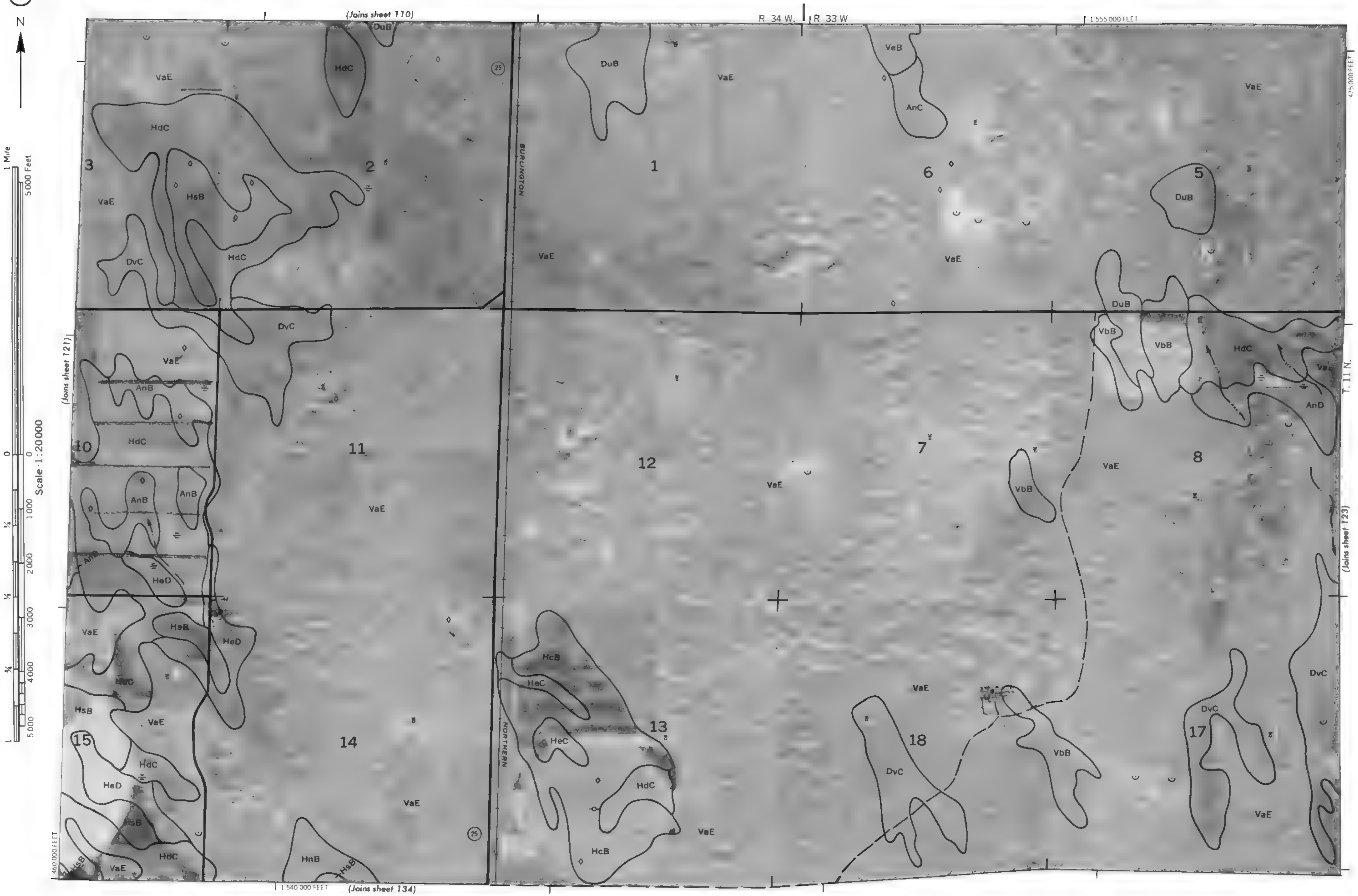


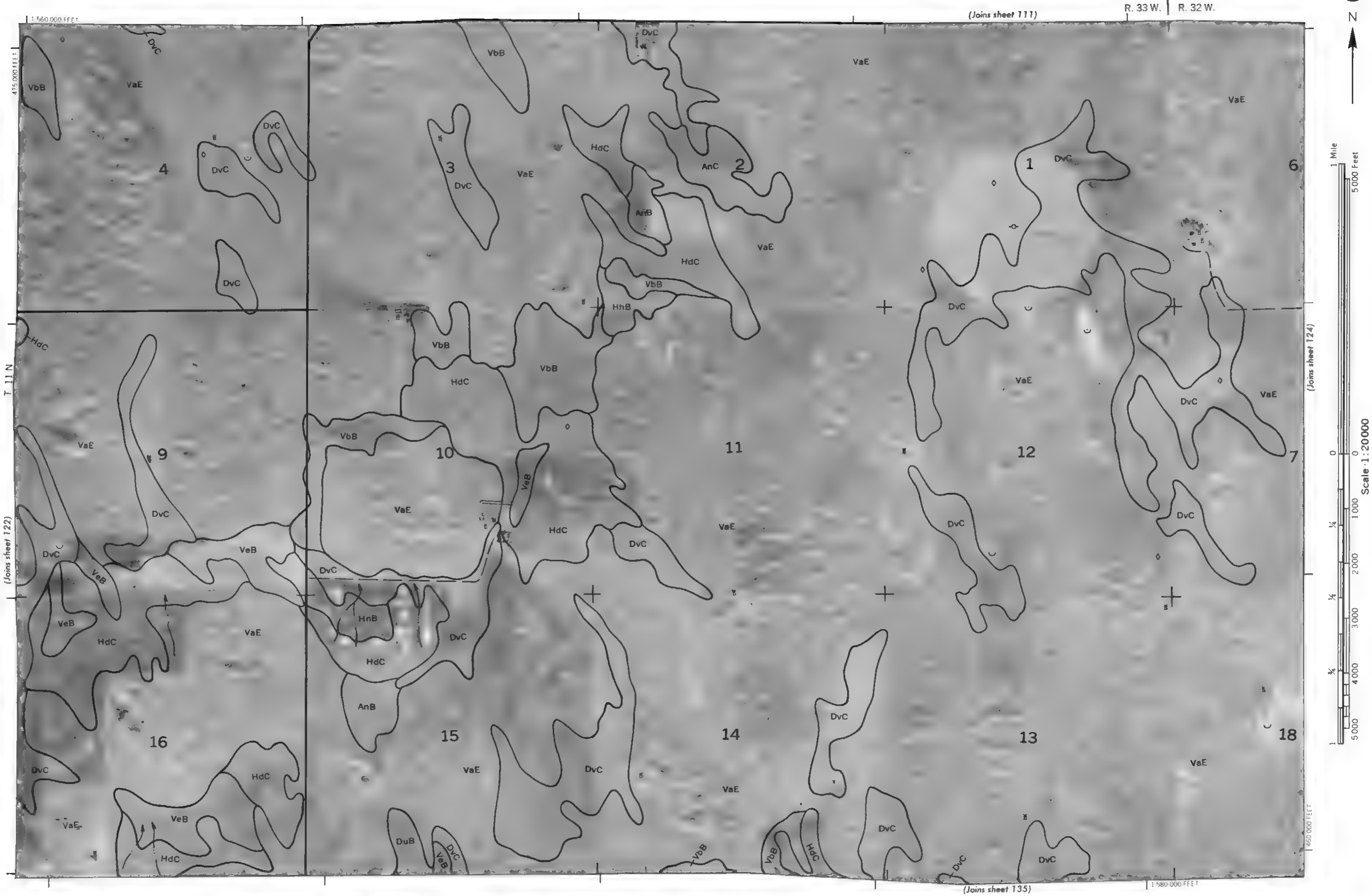
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 120



LINCOLN COUNTY, NEBRASKA NO. 121
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

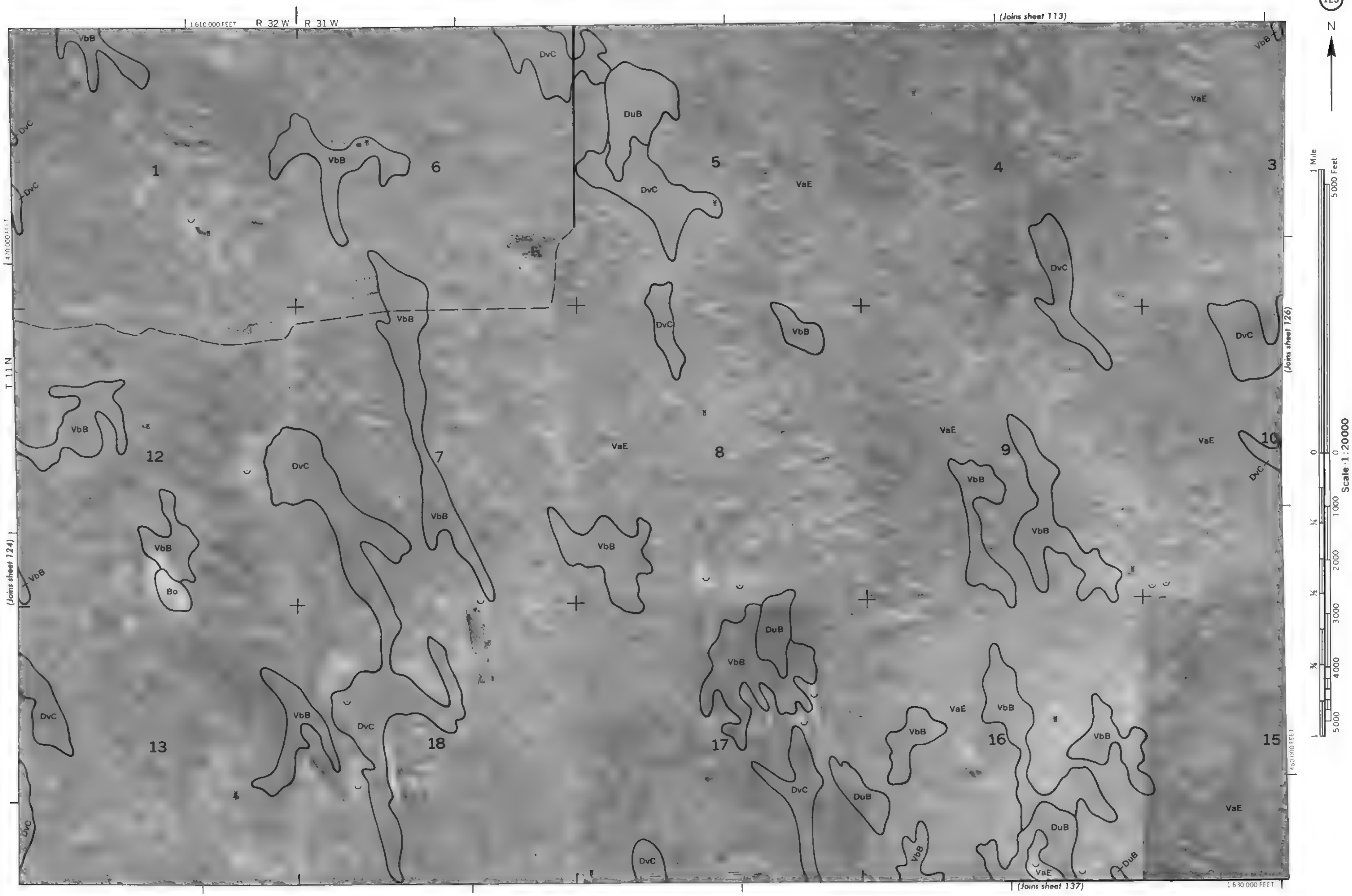

122
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 110)
(Joins sheet 121)
(Joins sheet 123)
(Joins sheet 134)
R. 34 W.
R. 33 W.
T. 11 N.
1 555 000 FEET
1 540 000 FEET
475 000 FEET
460 000 FEET
BURLINGTON
NORTHERN
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
VaE
DuB
HdC
HsB
DvC
AnB
AnC
AnD
VeB
VbB
HeD
HeC
HcB
HnB
25



LINCOLN COUNTY, NEBRASKA NO. 123

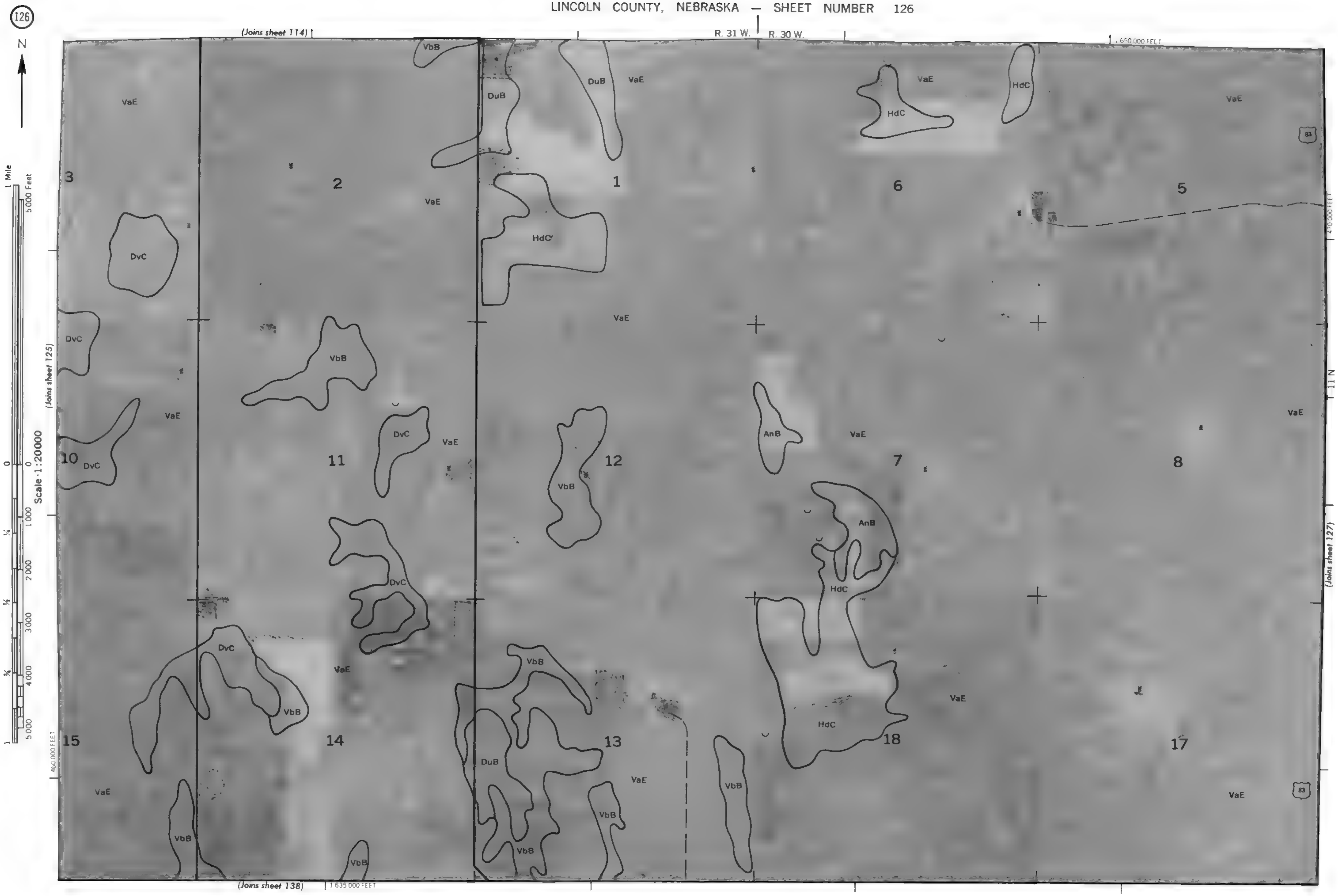
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

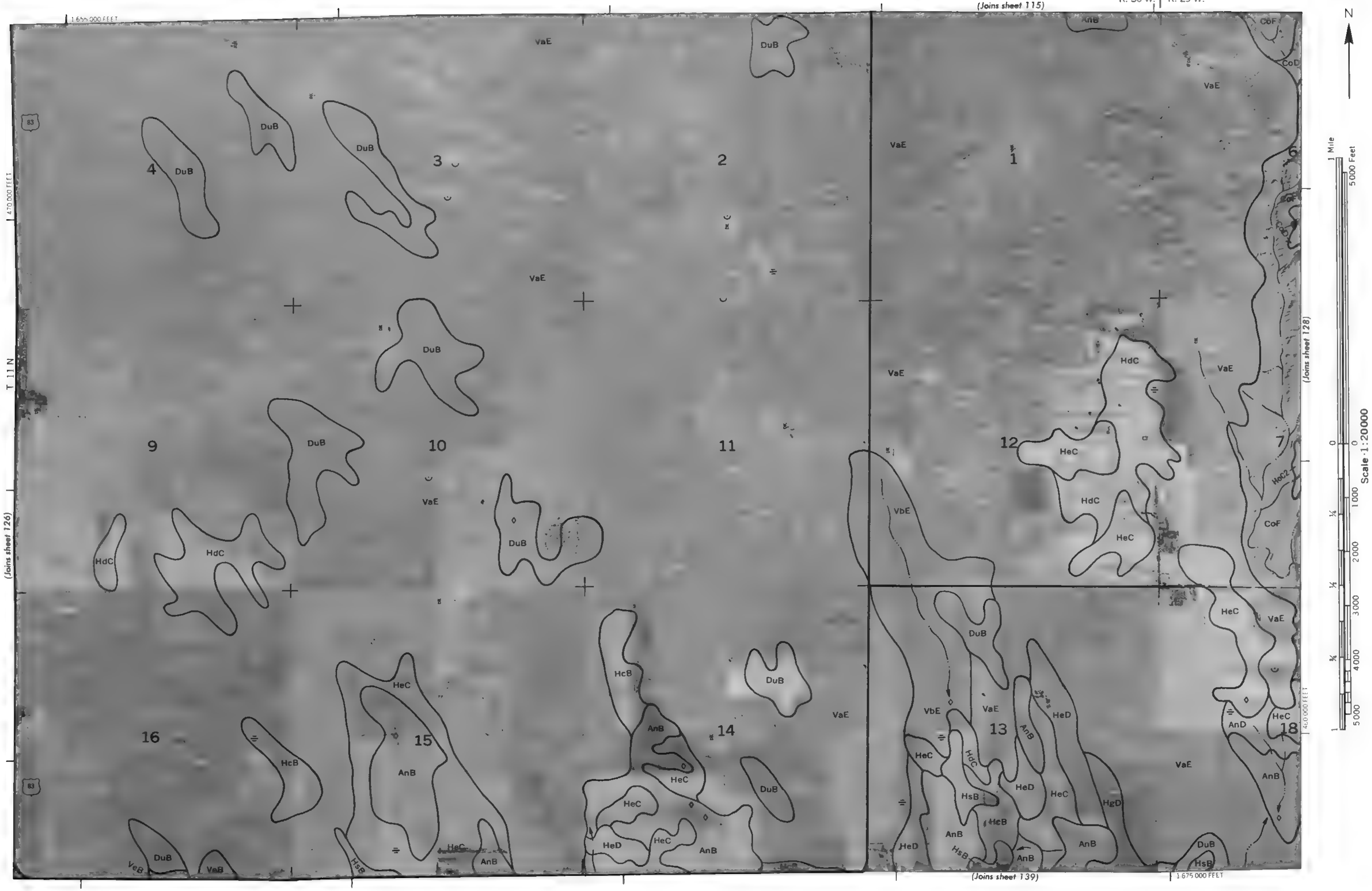


LINCOLN COUNTY, NEBRASKA NO. 125

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LINCOLN COUNTY, NEBRASKA NO. 127

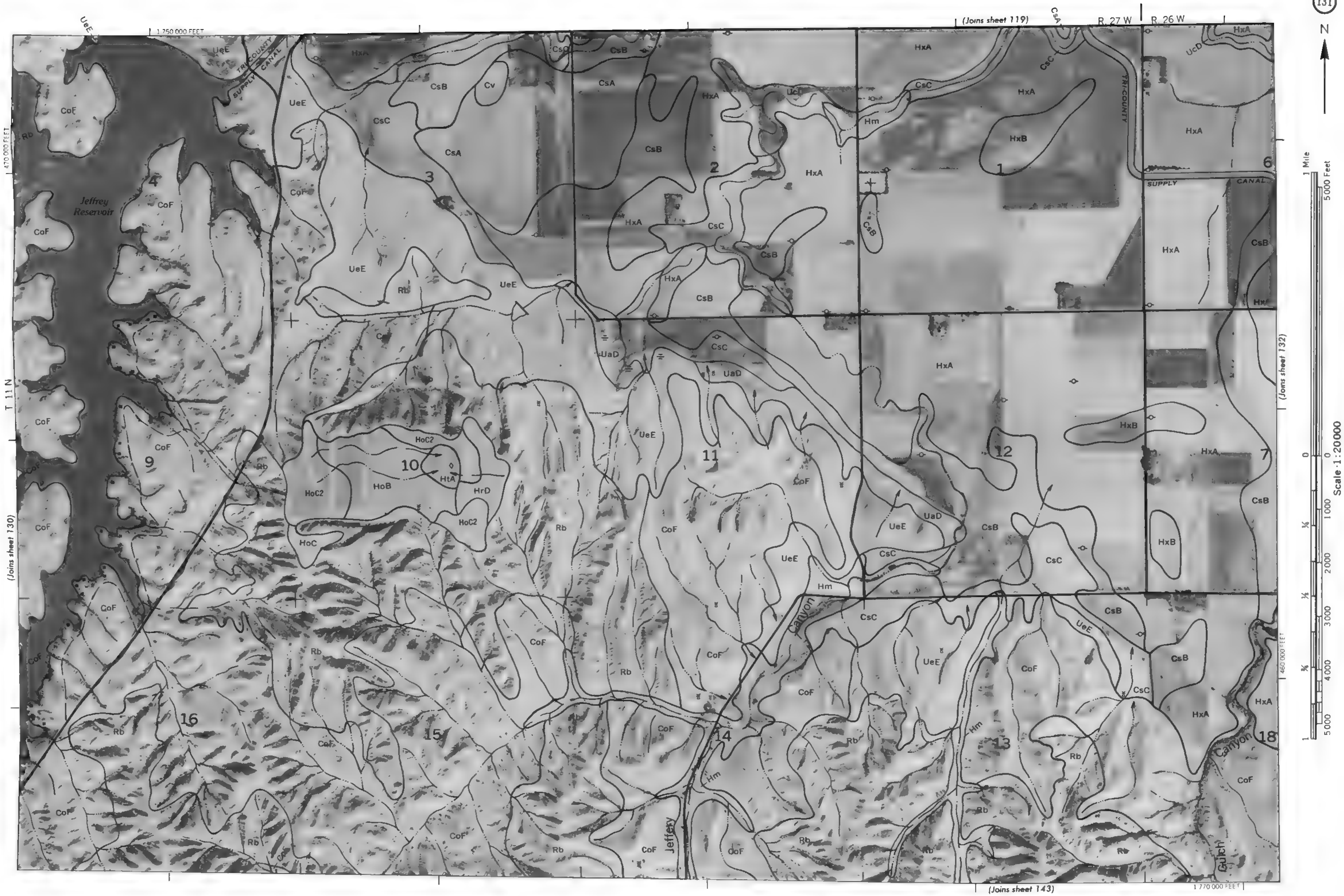
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 129

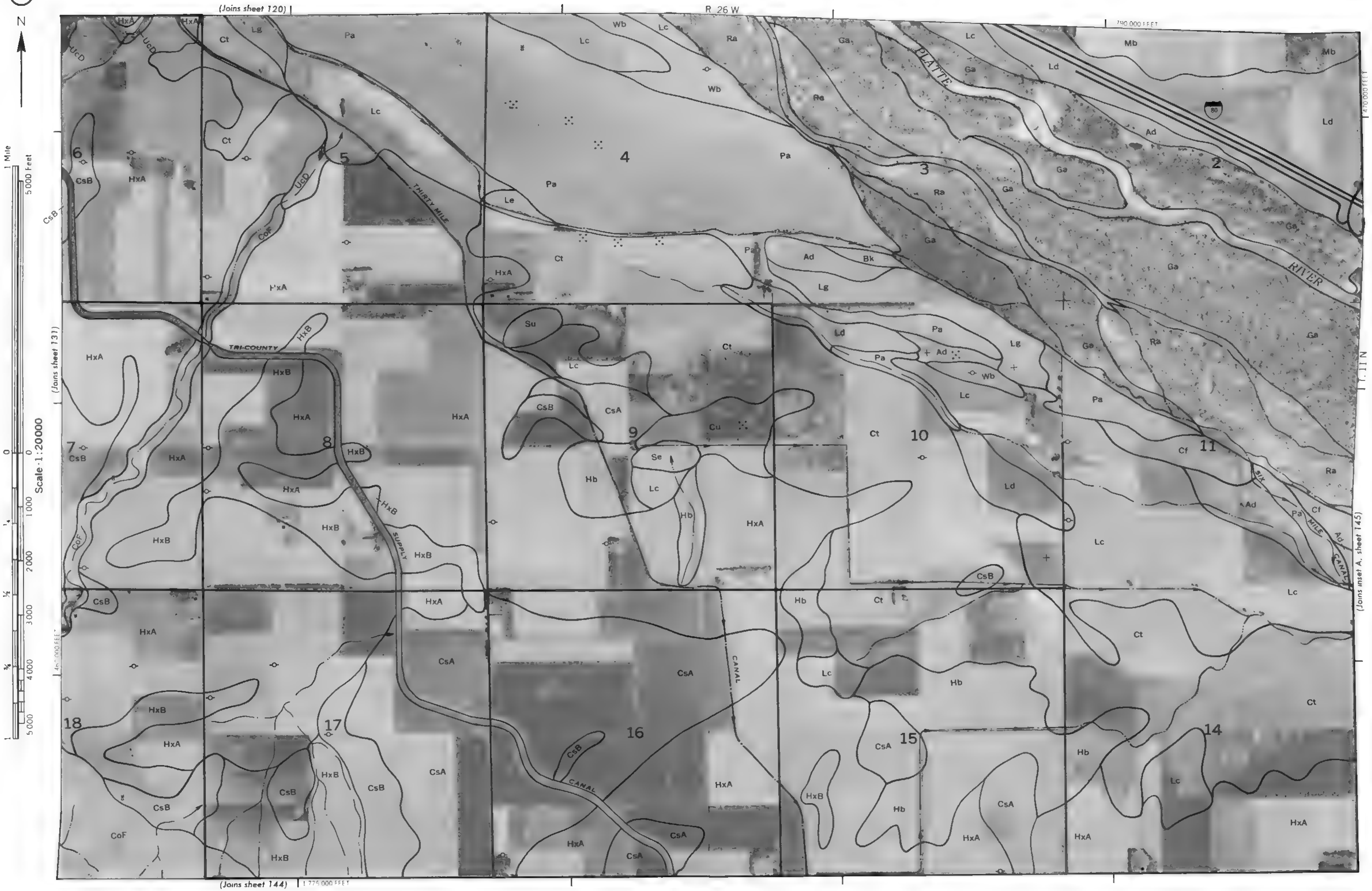
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

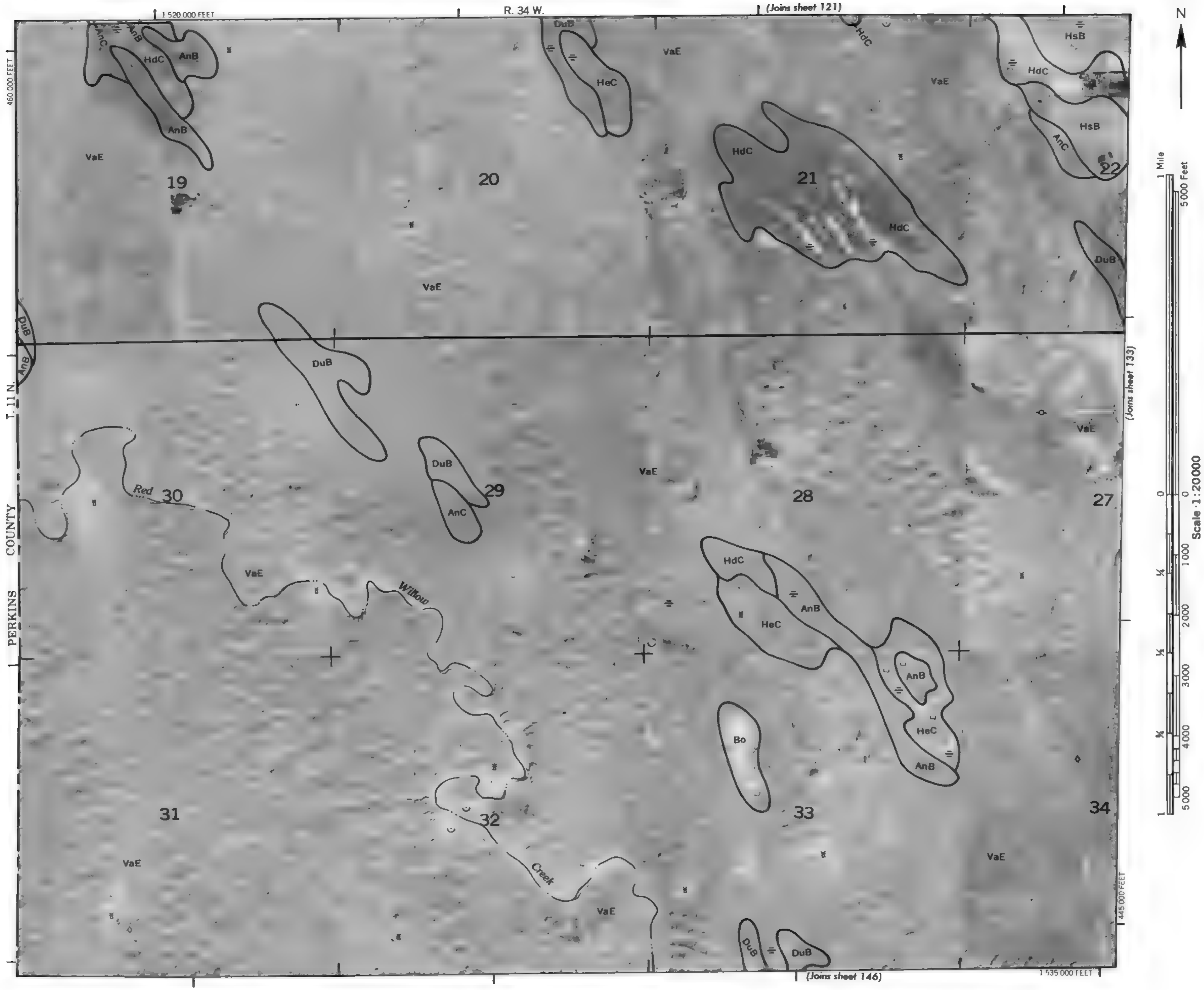
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LINCOLN COUNTY, NEBRASKA NO. 131

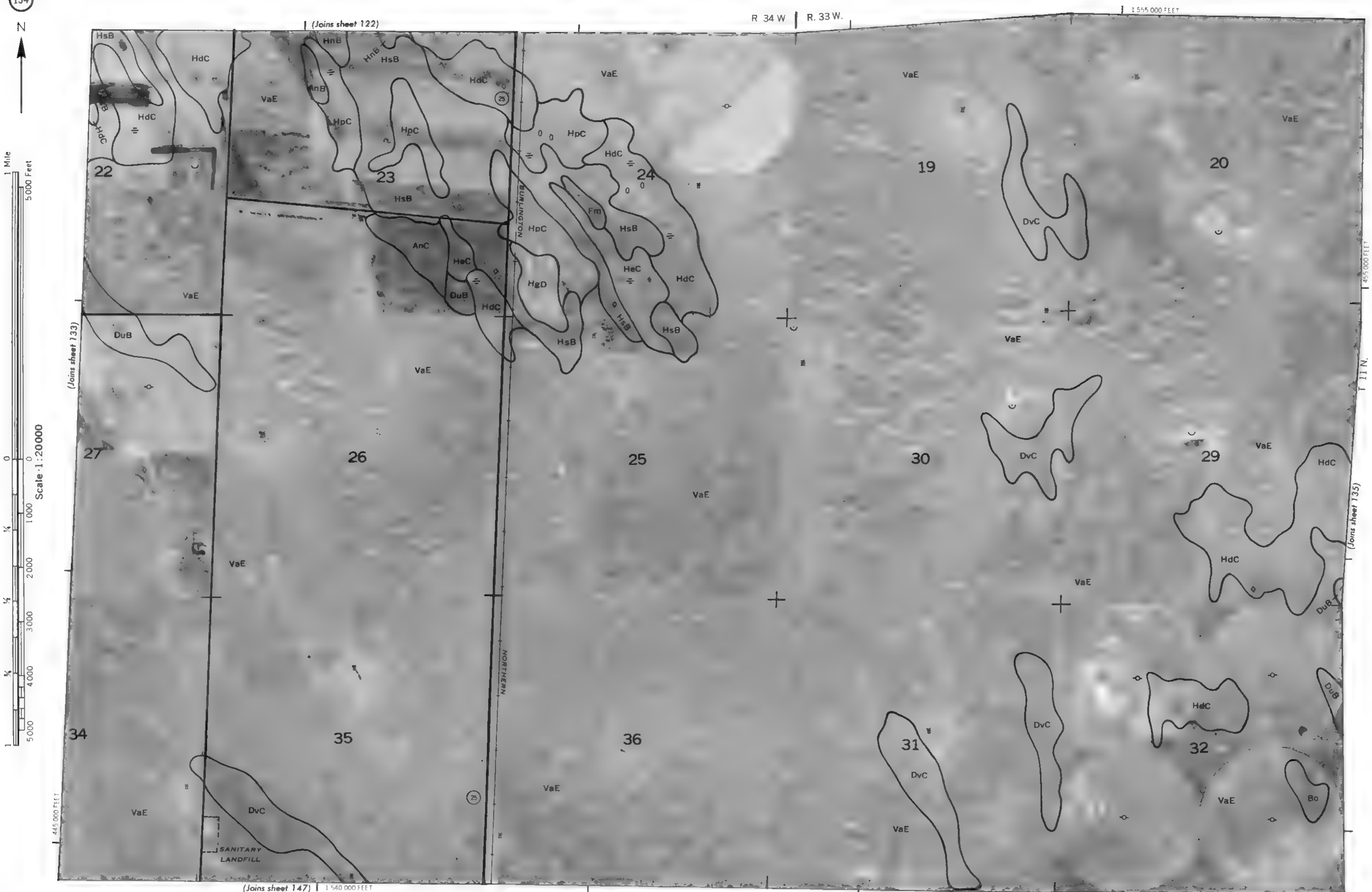
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 120)
R. 26 W
790 000 FEET
470 000 FEET
(Joins sheet 131)
T. 11 N.
(Joins inset A, sheet 145)
(Joins sheet 144)
1 775 000 FEET
PLATTE
RIVER
THIRTY MILE
TRI-COUNTY
SUPPLY
CANAL
SIX MILE
CANAL
80
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18

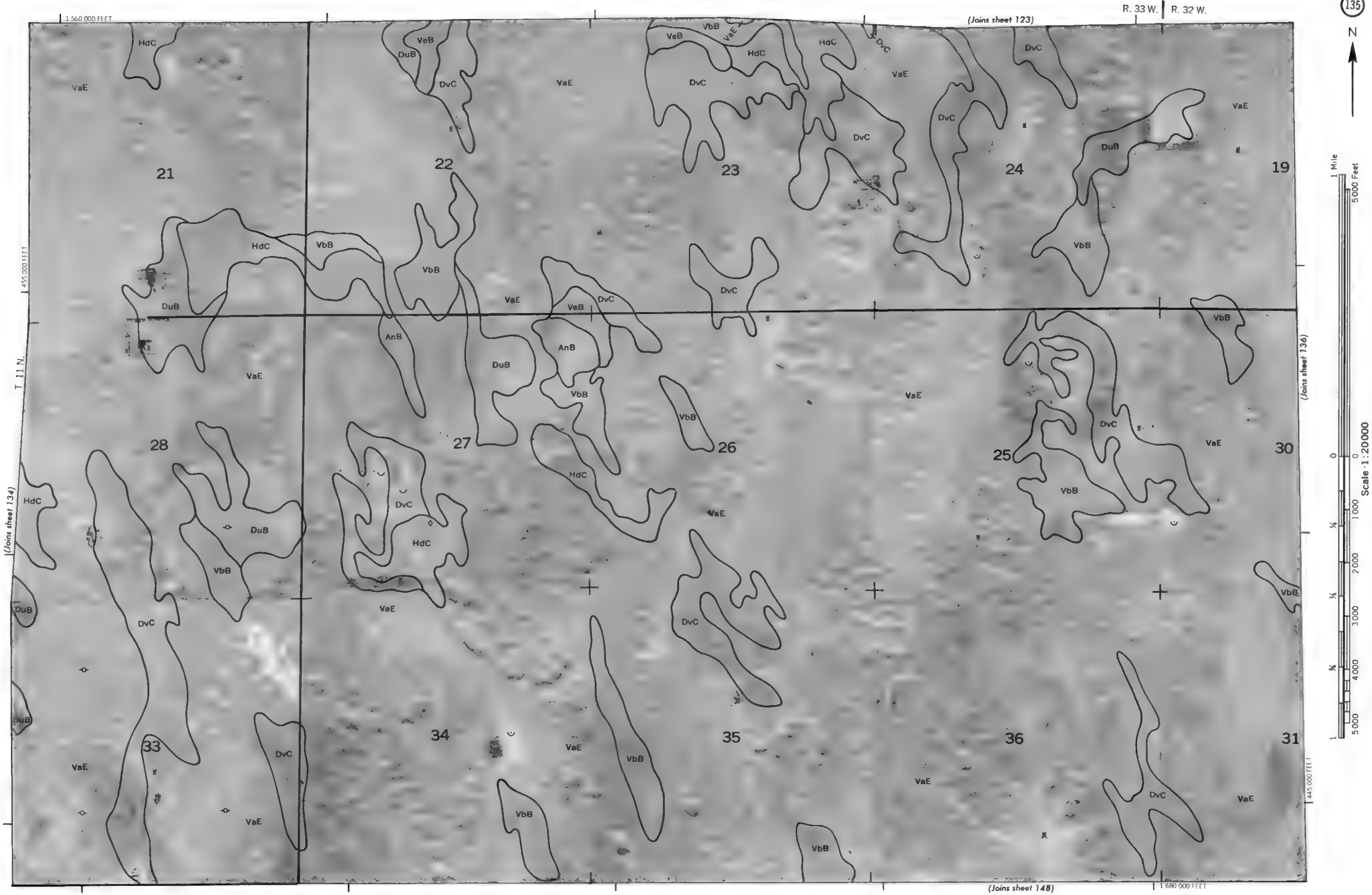


LINCOLN COUNTY, NEBRASKA NO. 133

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

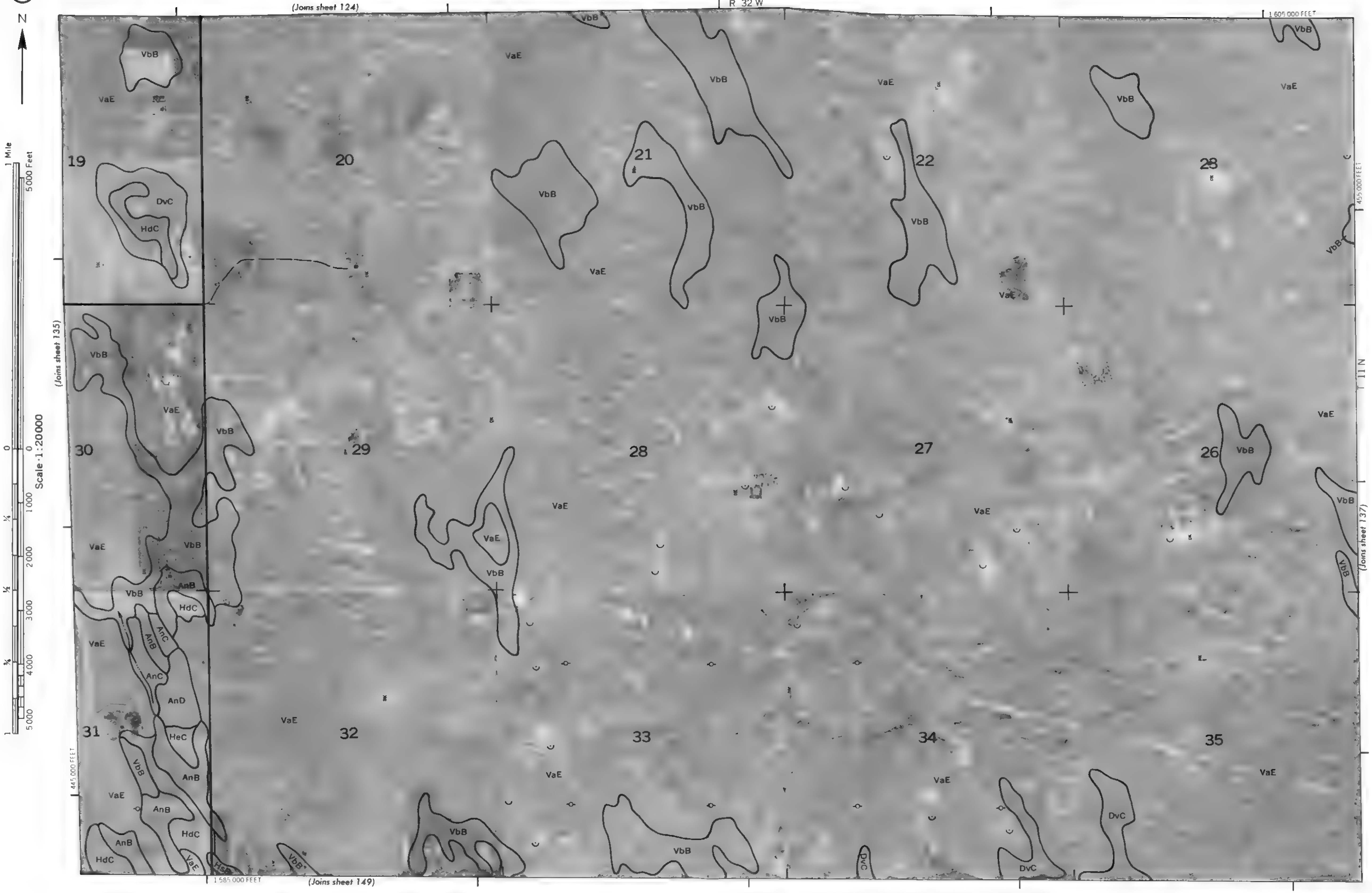


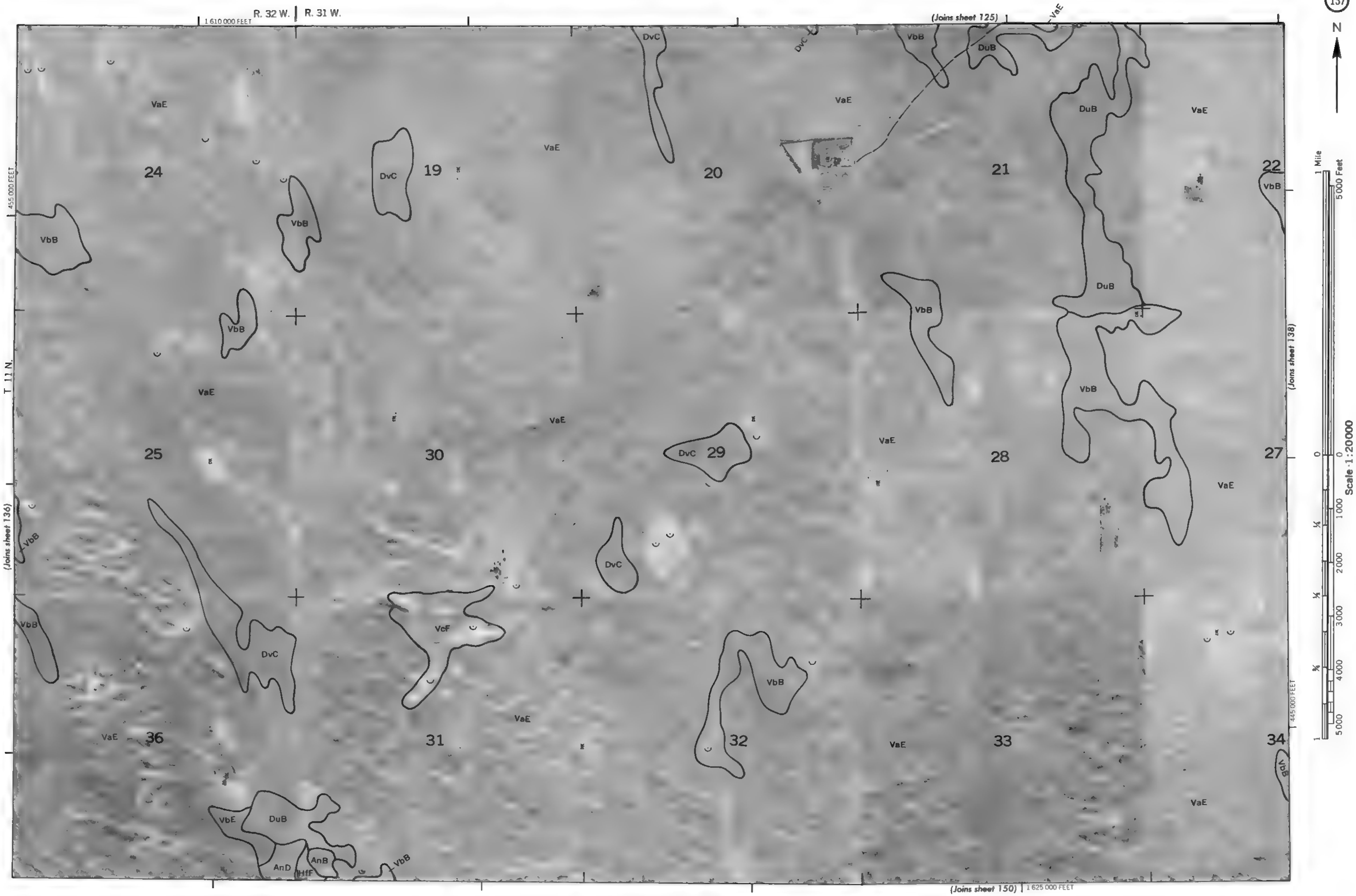
This map is compiled on 197? aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land divisions or corners, if shown, are approximately positioned.



LINCOLN COUNTY, NEBRASKA NO. 135

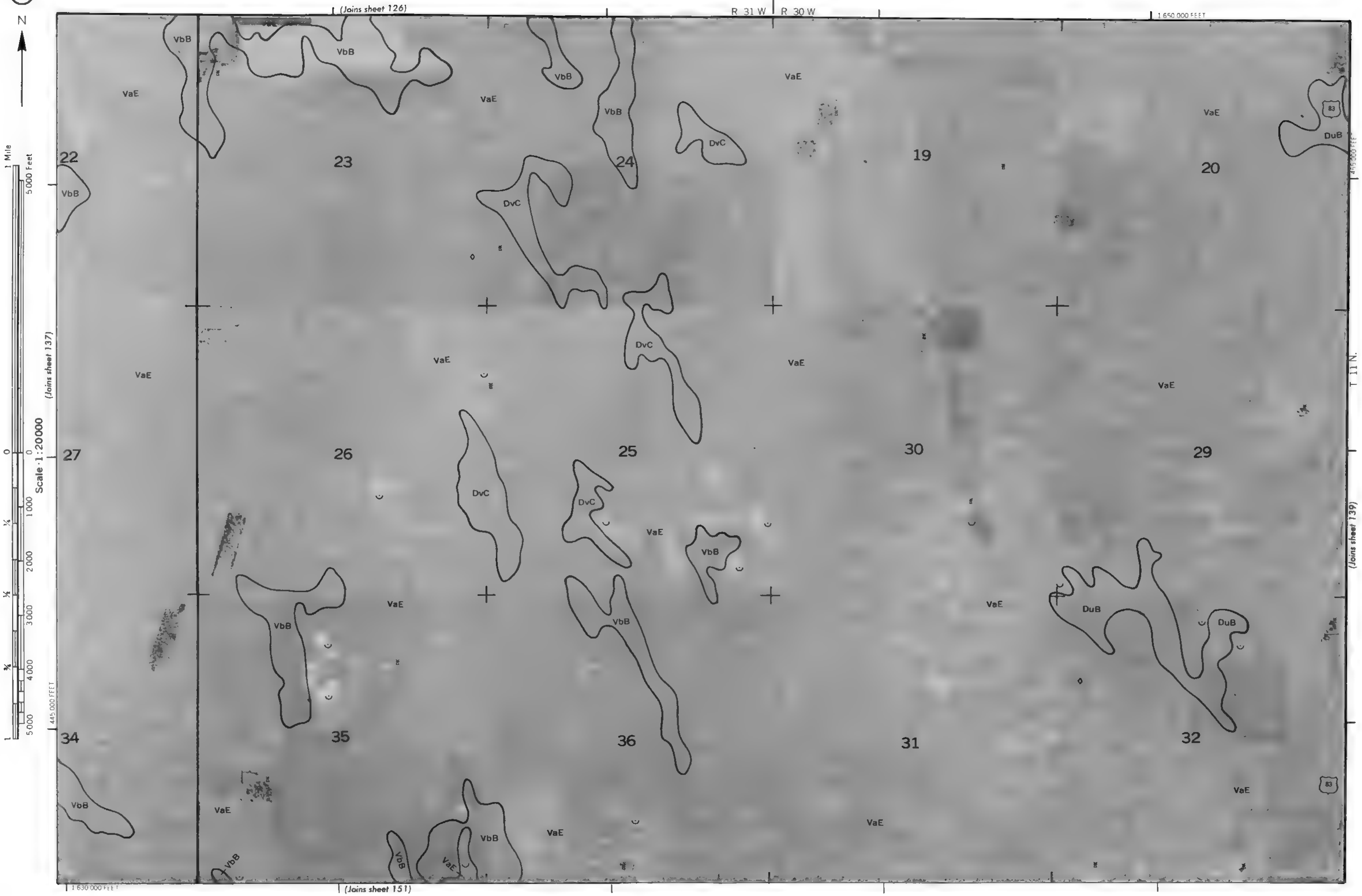
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

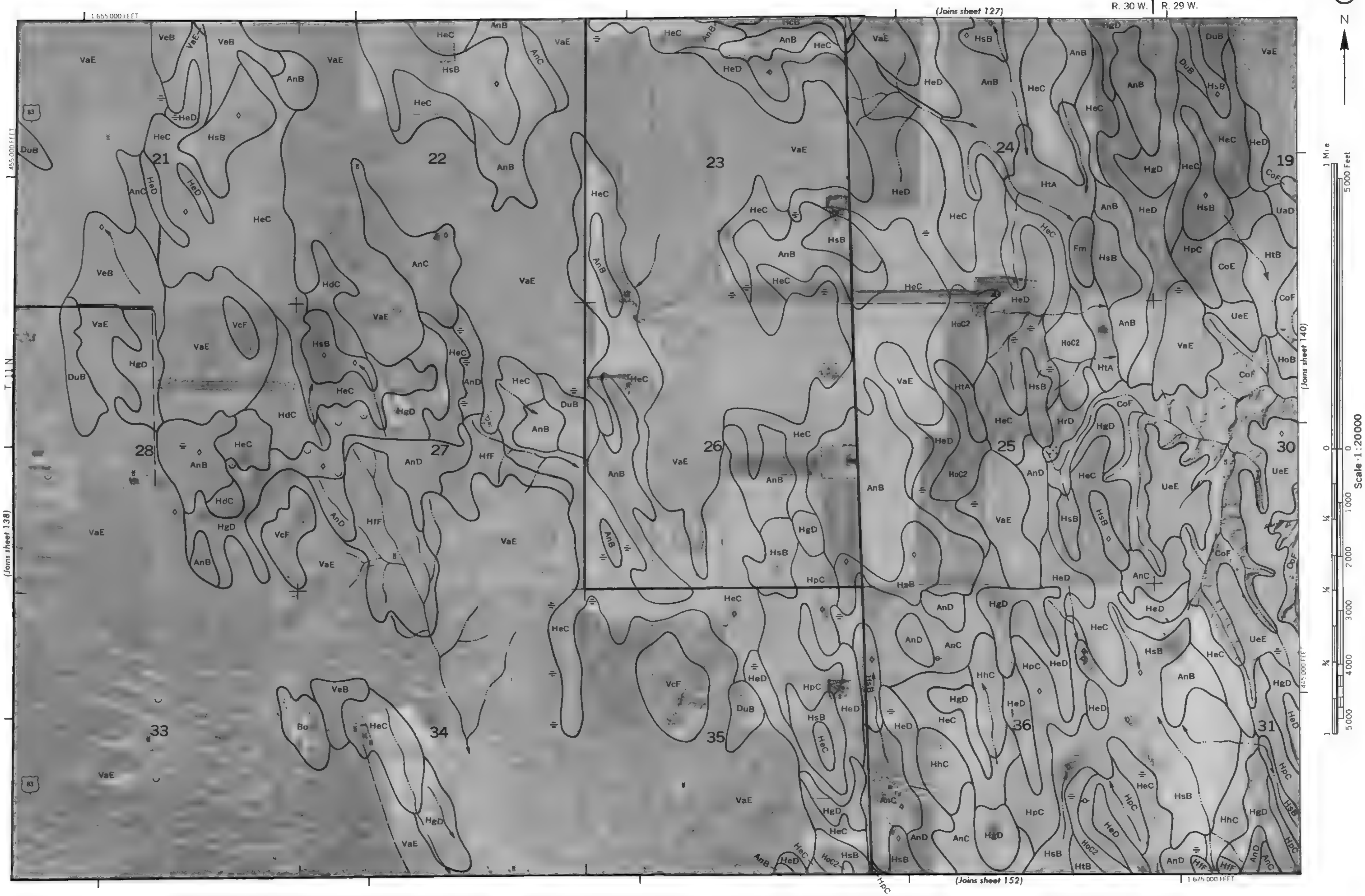

N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 124)
R 32 W
1 605 000 FEET
455 000 FEET
T 11 N
(Joins sheet 135)
(Joins sheet 137)
(Joins sheet 149)
1 585 000 FEET
445 000 FEET
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
VbB
VaE
DvC
HdC
AnB
AnC
AnD
HeC



LINCOLN COUNTY, NEBRASKA NO. 137

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

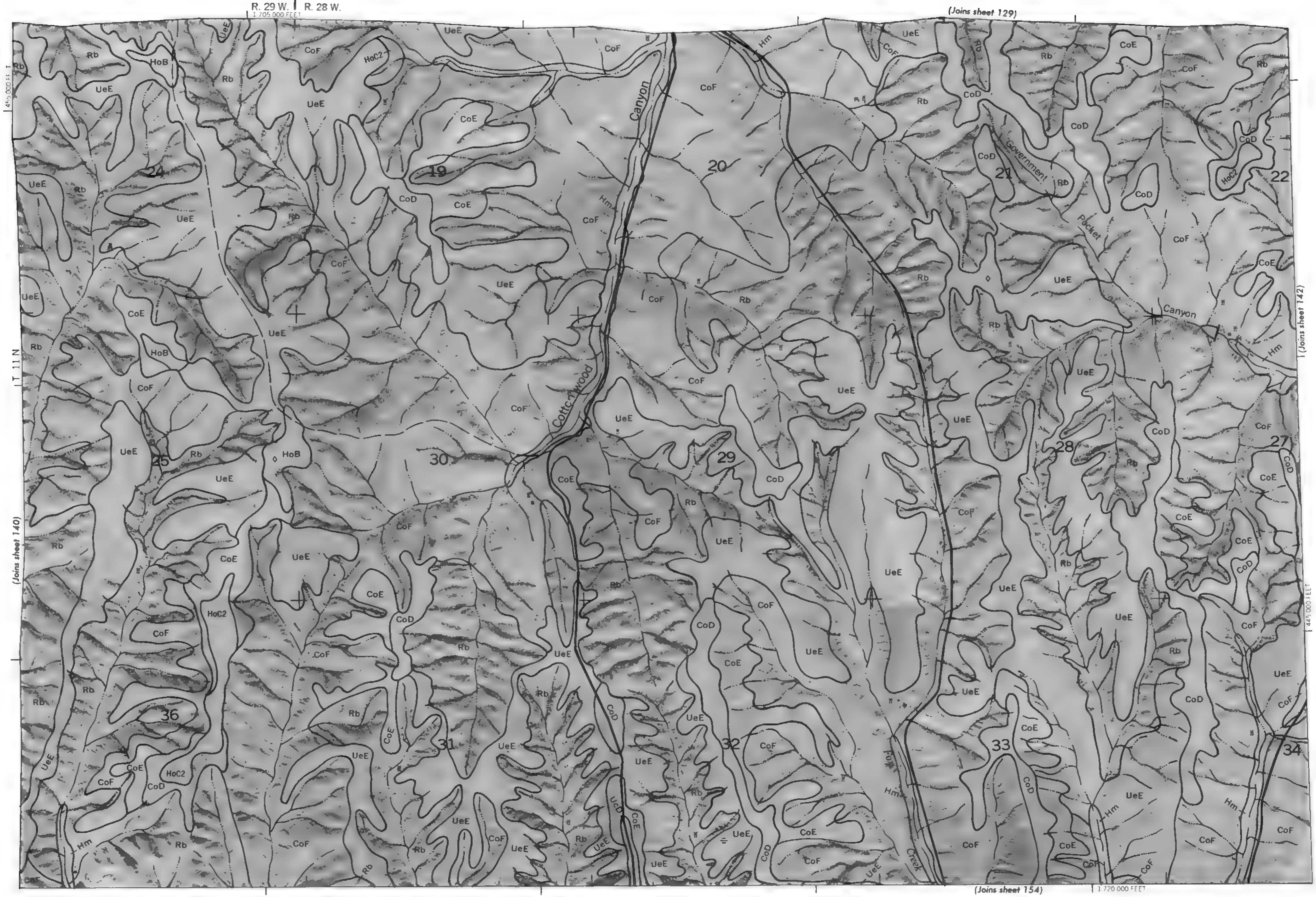

(Joins sheet 126)
R. 31 W.
R. 30 W.
1 650 000 FEET
N
VbB
VbB
VaE
VaE
VbB
VbB
VaE
DvC
VaE
83
DuB
22
23
24
19
20
VbB
DvC
1 Mile
5 000 Feet
Scale 1:20000
(Joins sheet 137)
DvC
VaE
VaE
VaE
VaE
T. 11 N.
27
26
25
30
29
DvC
DvC
VaE
VbB
(Joins sheet 139)
VbB
VaE
VbB
VaE
DuB
DuB
445 000 FEET
34
35
36
31
32
VbB
VaE
VaE
VbB
VbB
VaE
VaE
VaE
83
VbB
1 630 000 FEET
(Joins sheet 151)



LINCOLN COUNTY, NEBRASKA NO. 139

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 128)
R 29 W
(Joins sheet 139)
(Joins sheet 141)
(Joins sheet 153)
T 11 N
Scale 1:20000
1 Mile
5 000 Feet
455 000 FEET
445 000 FEET
1 680 000 FEET
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
Well
Canyon
Cut
Canyon
CoF
CoD
CoE
UeE
VaE
HoC
HoB
HoC2
UaD
HtB
UcD
Rb
Hm
HaB
HeD
HpC
HsB
HrD
HgD
HgB



141

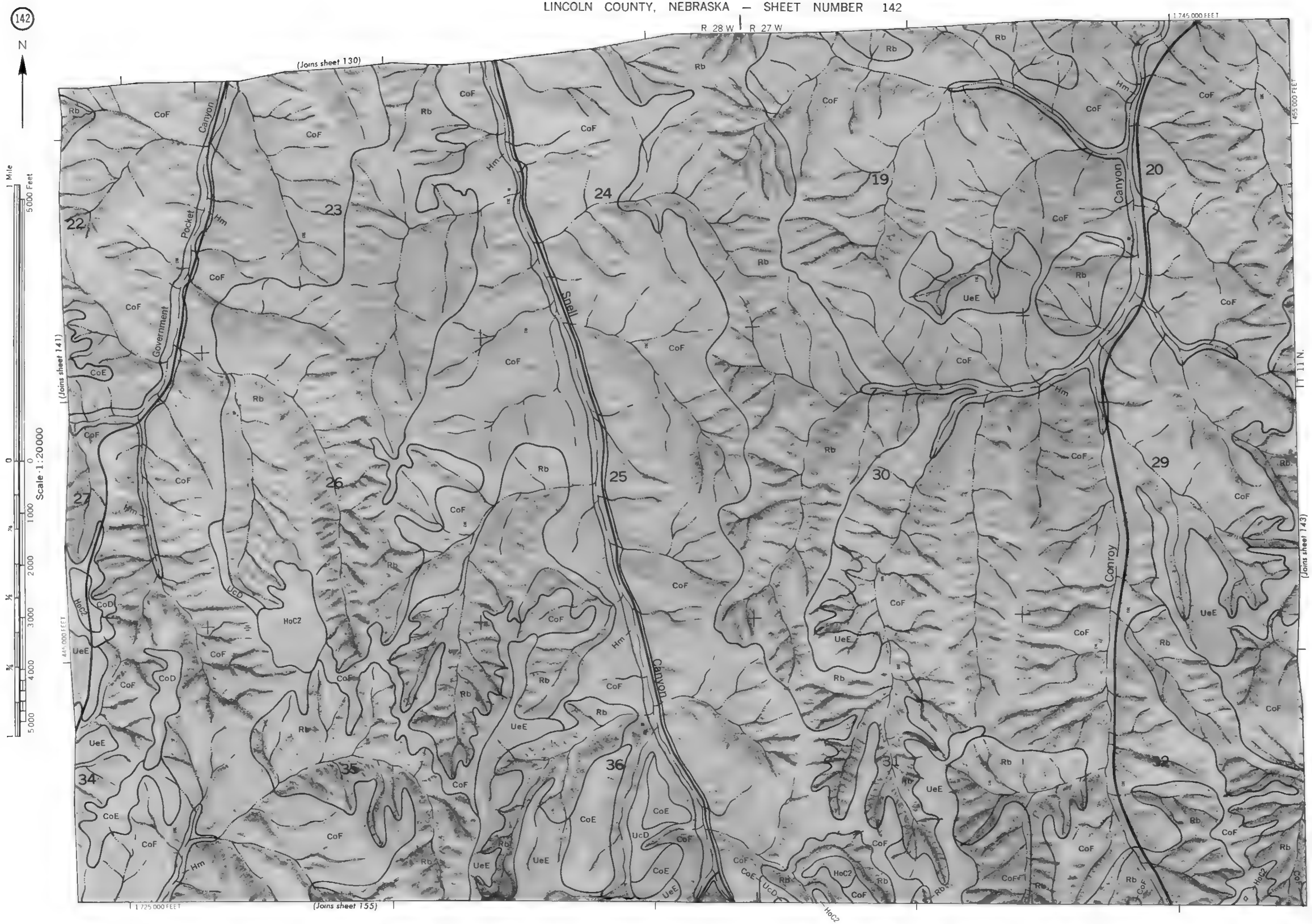
N

Scale 1:20000

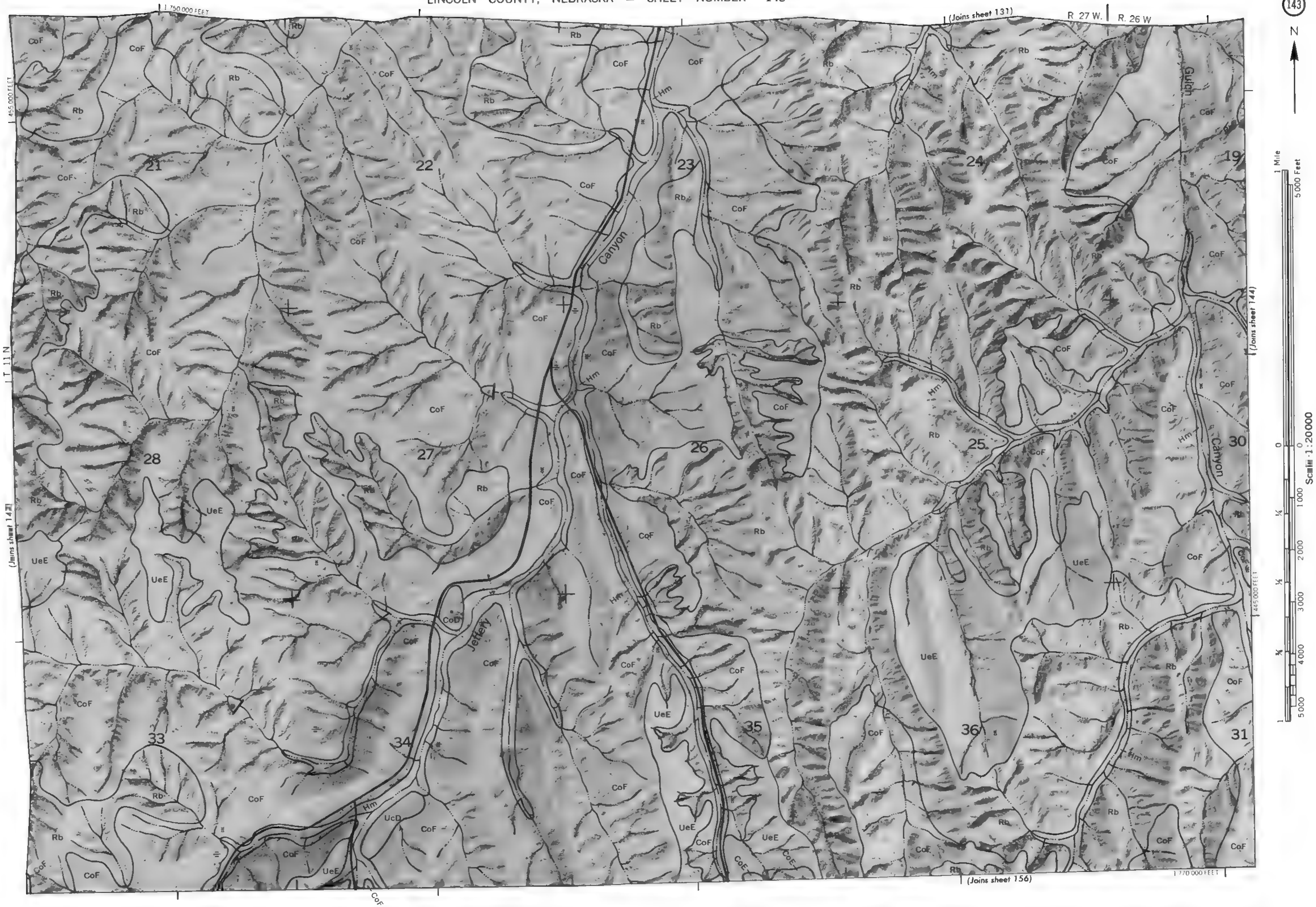
1 Mile
0
¼
½
¾
5000 Feet
0
1000
2000
3000
4000
5000

LINCOLN COUNTY, NEBRASKA NO. 141

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

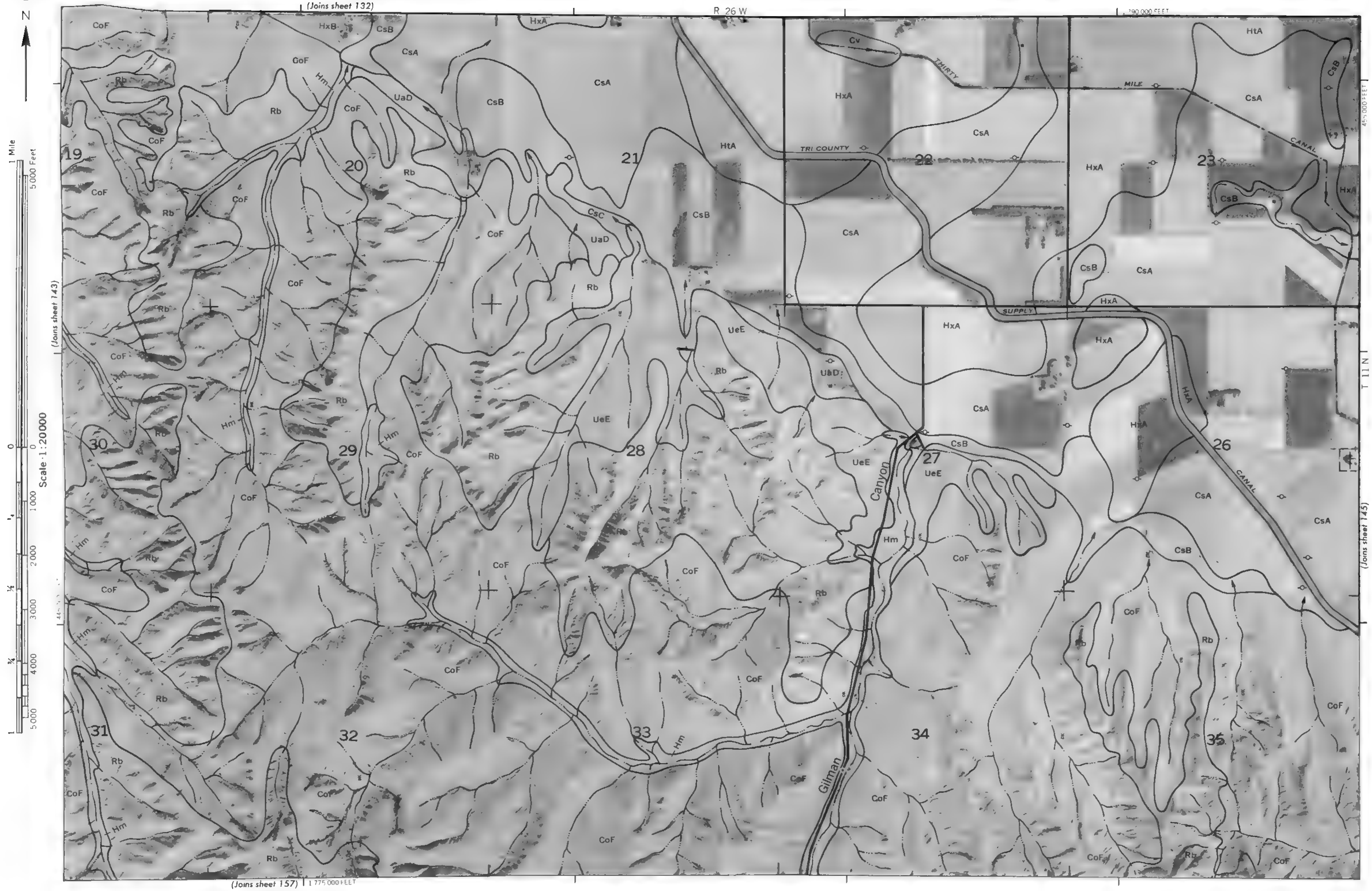


LINCOLN COUNTY, NEBRASKA NO. 142



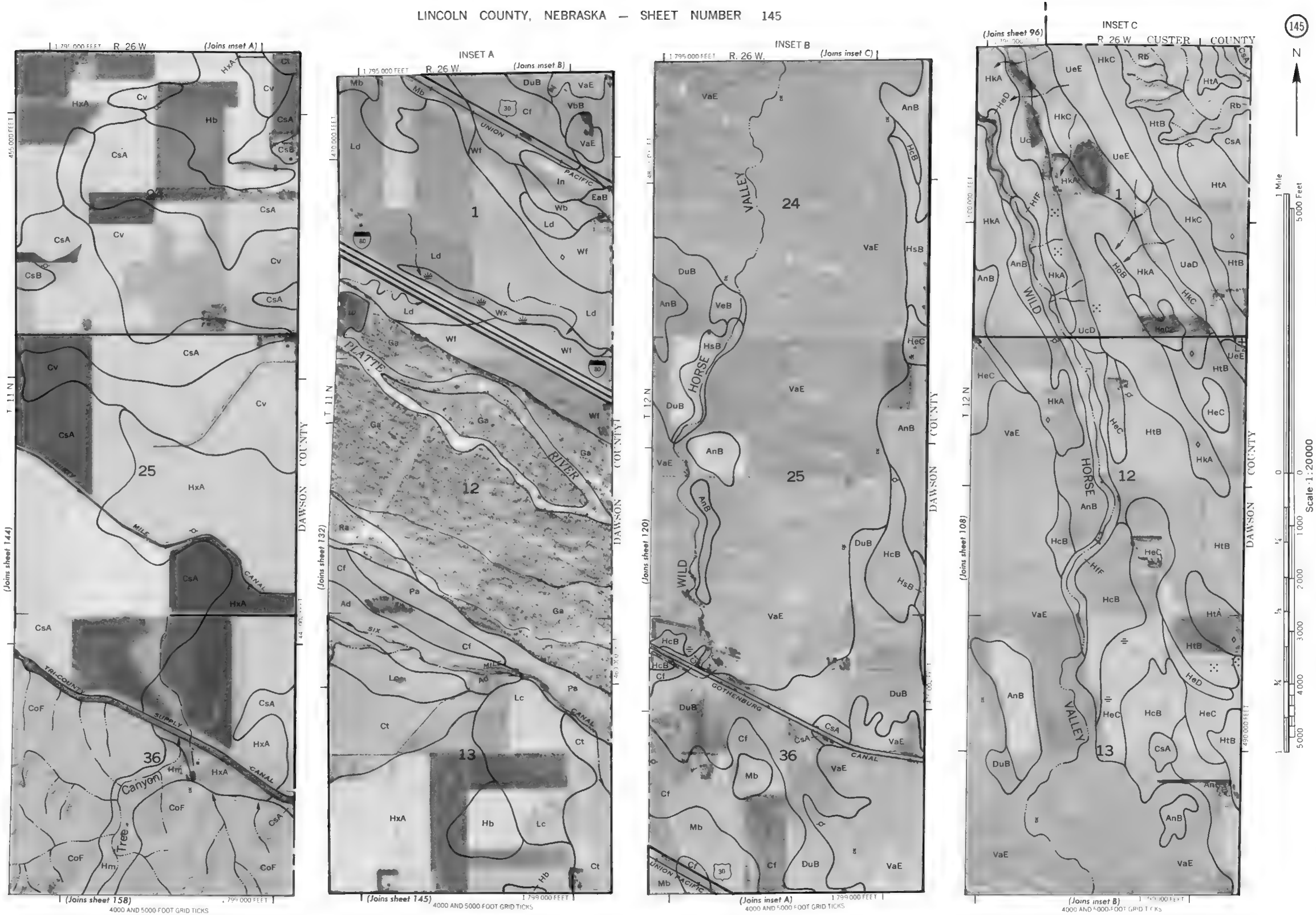
LINCOLN COUNTY, NEBRASKA NO. 143

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 132)
R. 26 W.
(Joins sheet 143)
(Joins sheet 145)
(Joins sheet 157)
T. 11 N.
THIRTY
MILE
TRI COUNTY
SUPPLY
CANAL
Canyon
Gilman
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
CoF
CsA
CsB
CsC
Cv
HtA
HxA
HxB
Hm
Rb
UaD
UeE

LINCOLN COUNTY, NEBRASKA NO. 145

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



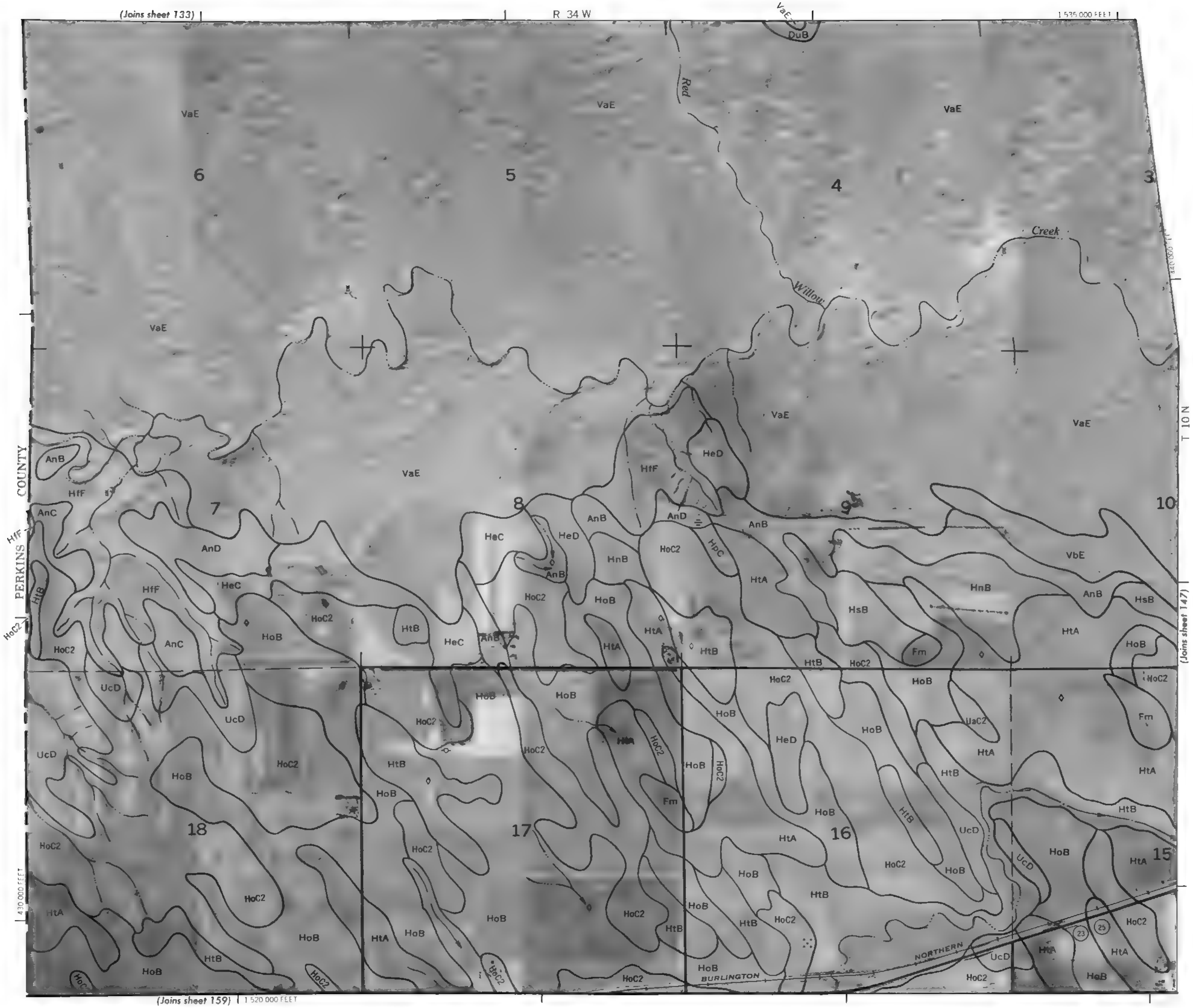
146

N

Scale 1:20000

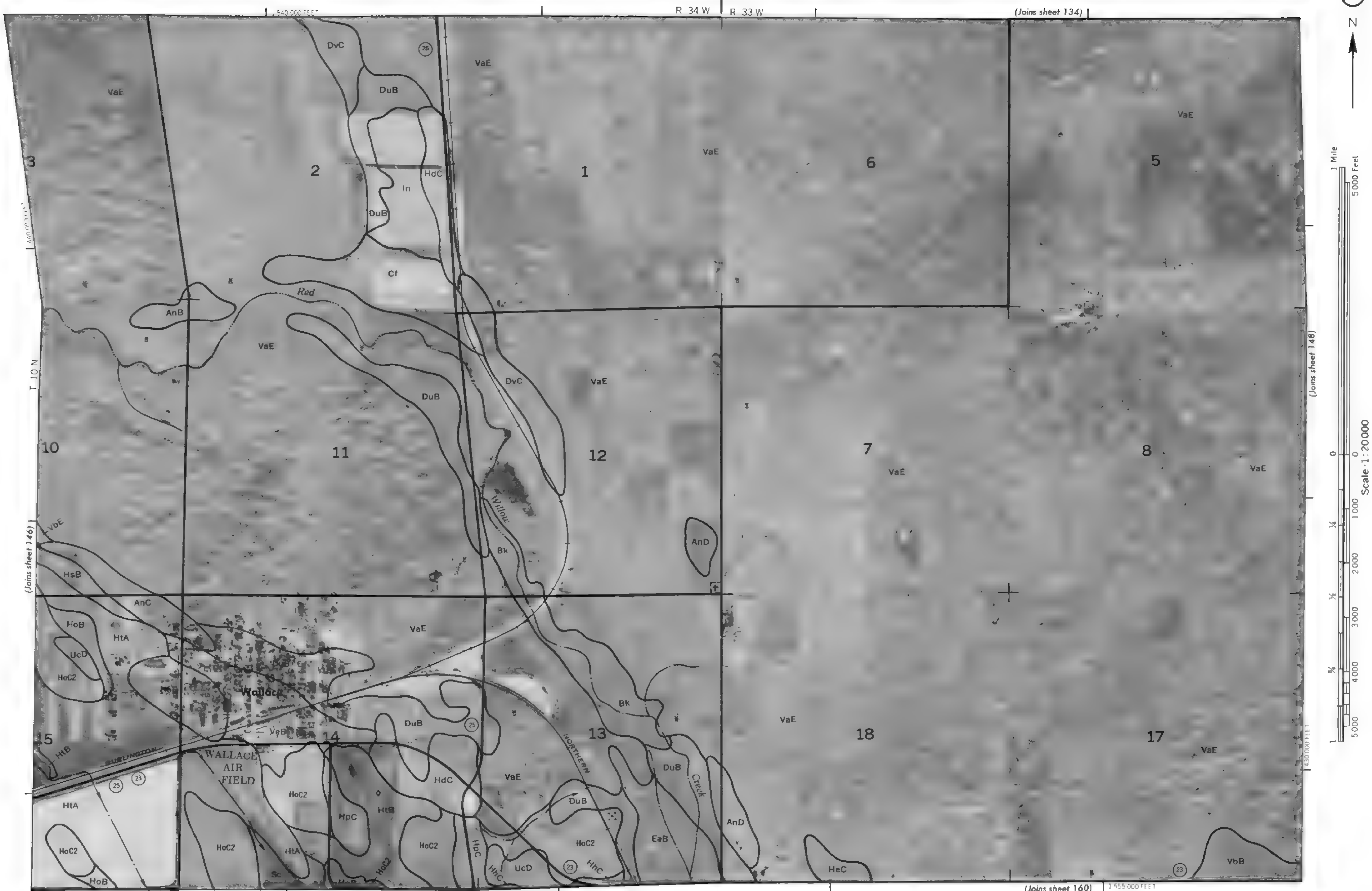
1 Mile

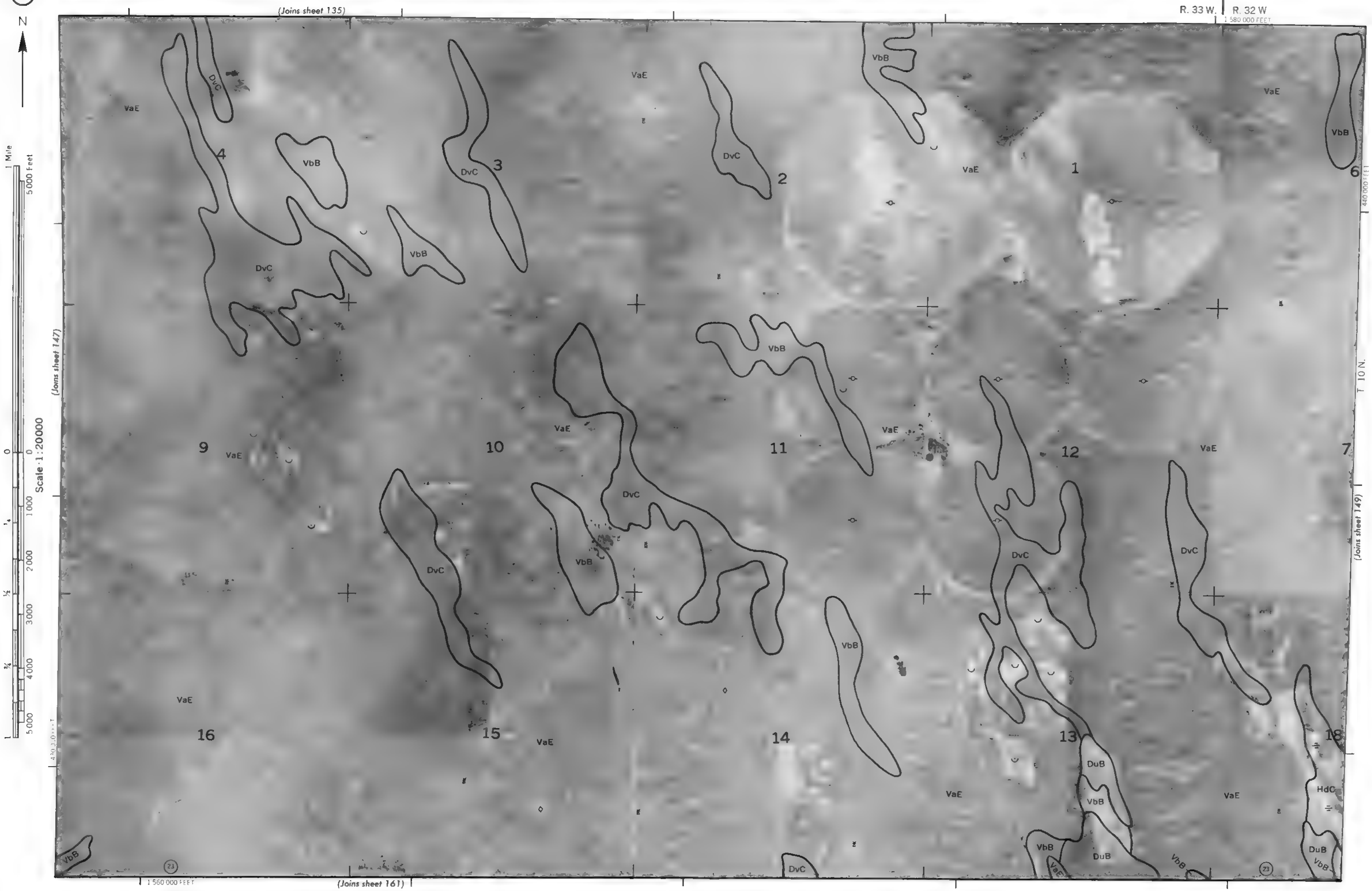
5000 Feet

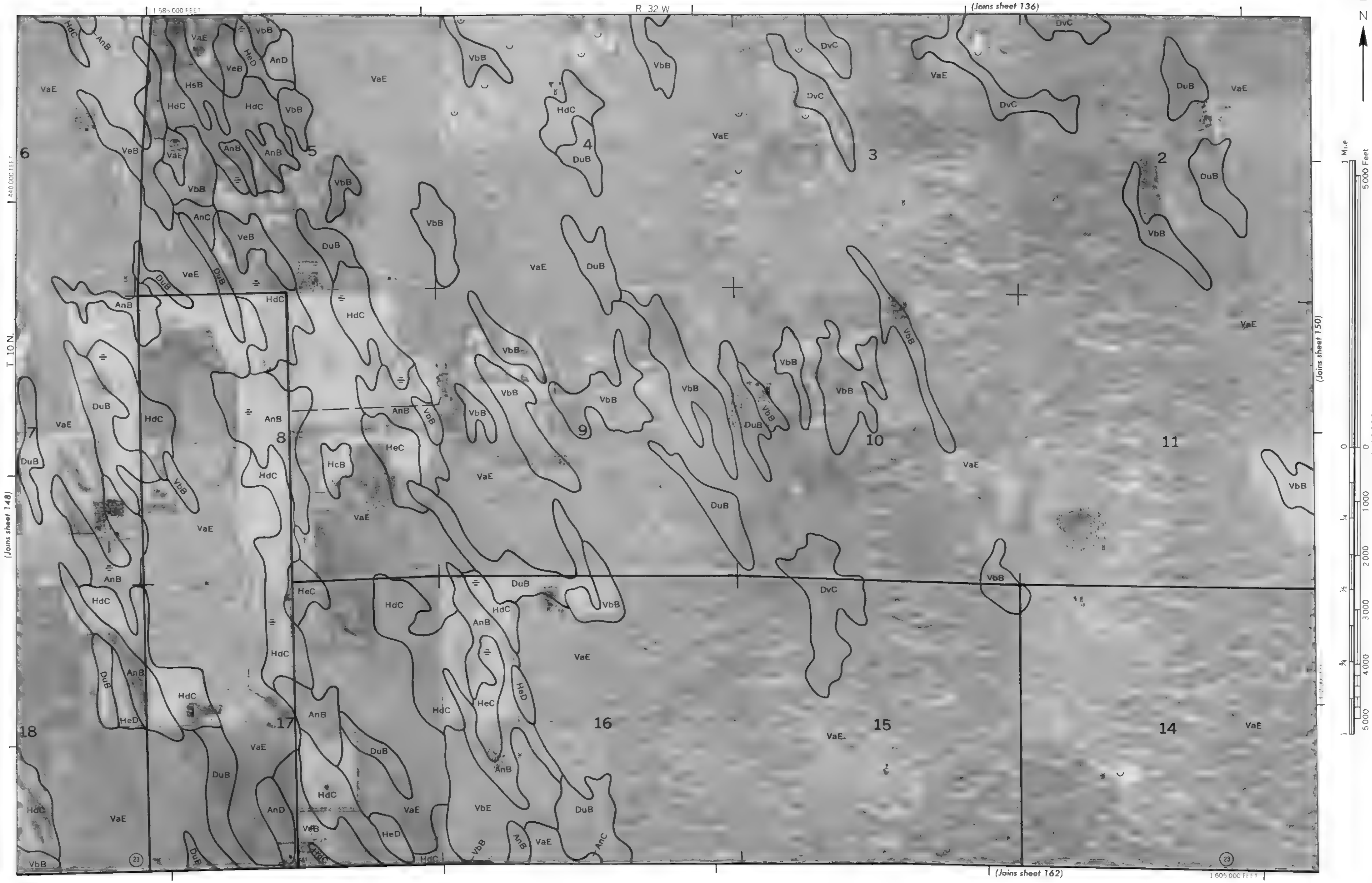


1 OLN COUNTY, NEBRASKA NO. 146

LINCOLN COUNTY, NEBRASKA NO. 147

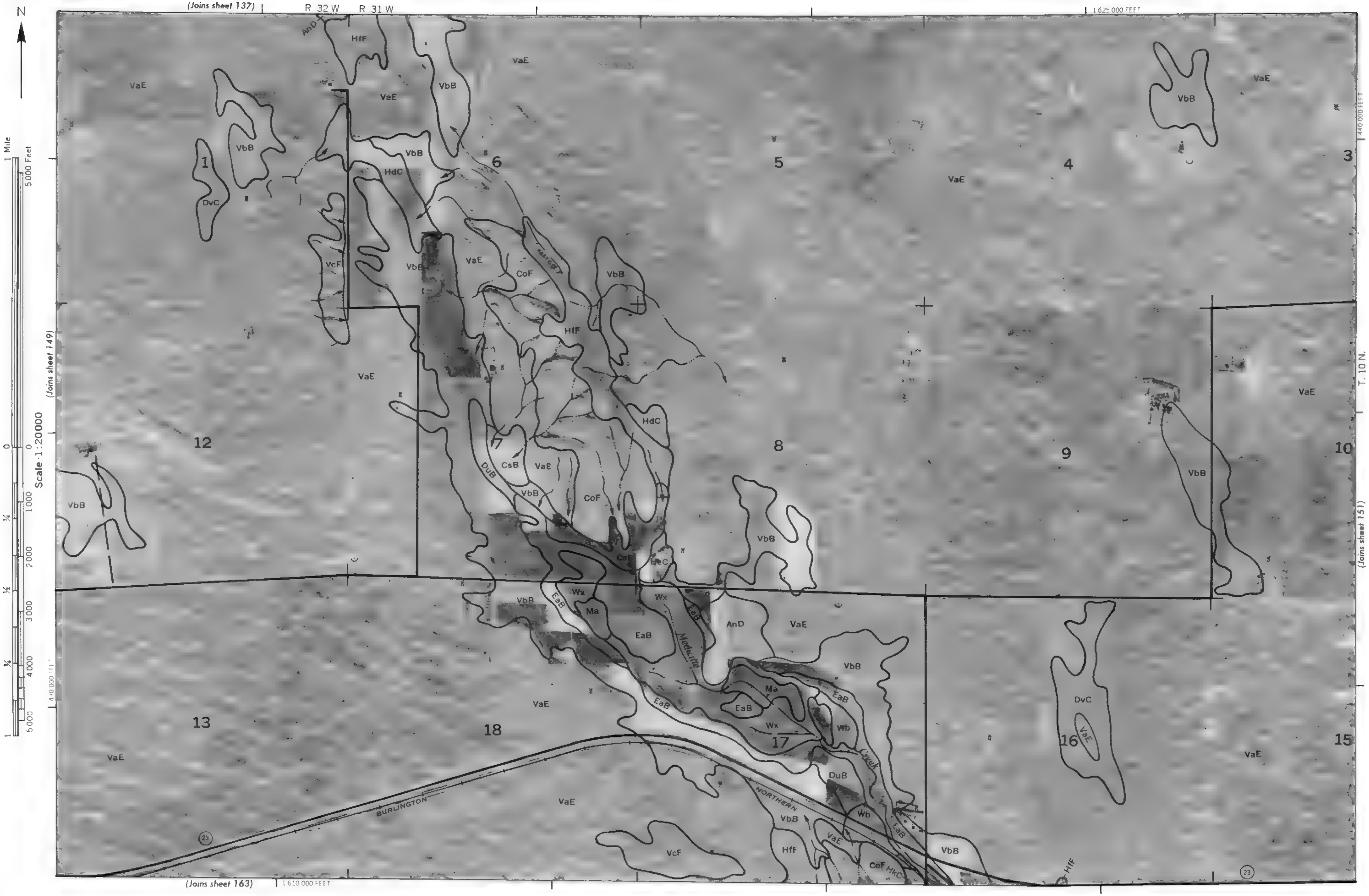


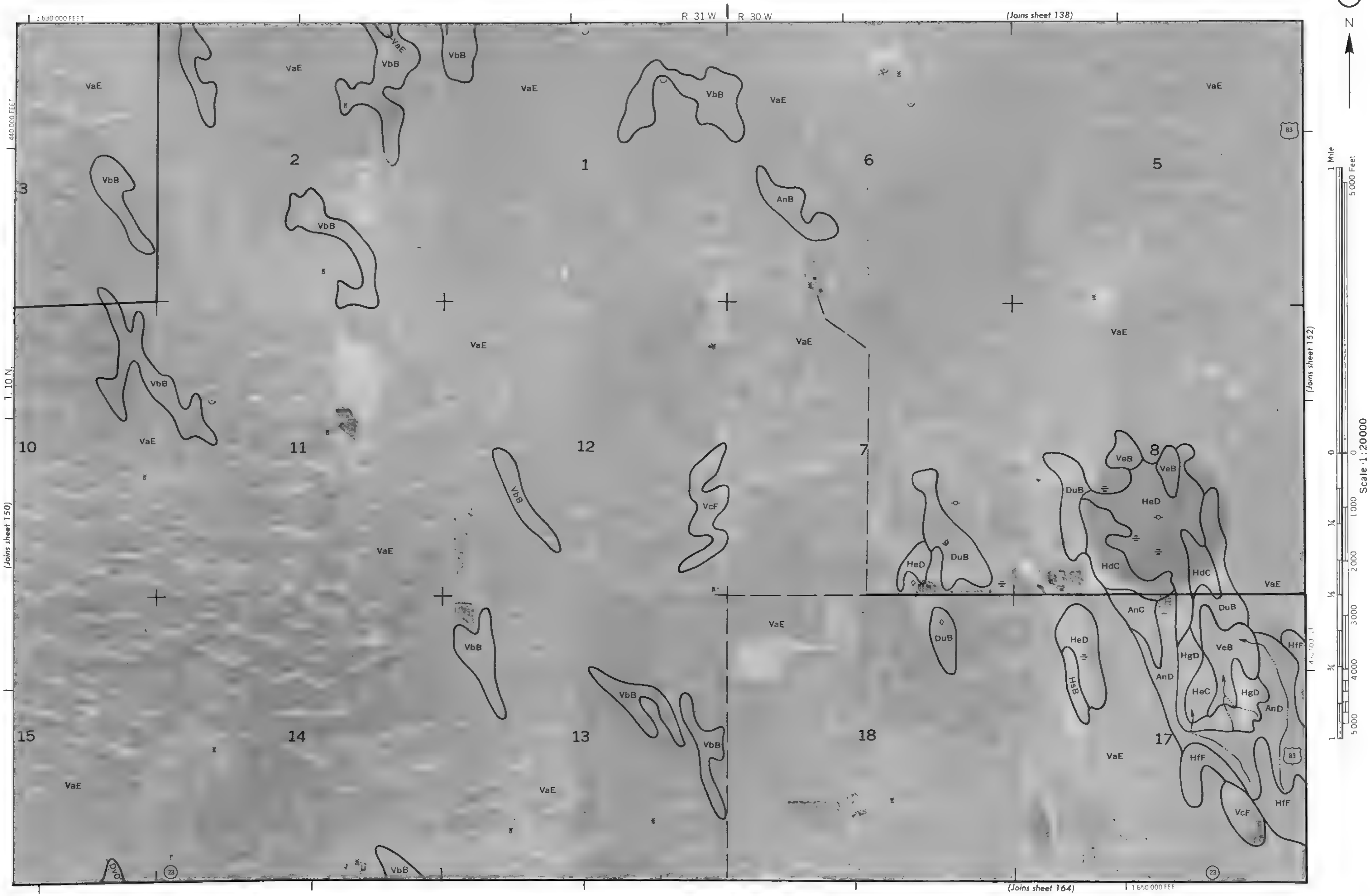

N
(Joins sheet 135)
R. 33 W.
R. 32 W
1 580 000 FEET
(Joins sheet 147)
(Joins sheet 149)
(Joins sheet 161)
1 560 000 FEET
T. 10 N.
440 000 FEET
Scale 1:20000
1 Mile
5000 Feet
1000
2000
3000
4000
5000
0
VaE
VbB
DvC
DuB
HdC
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18



LINCOLN COUNTY, NEBRASKA NO. 149

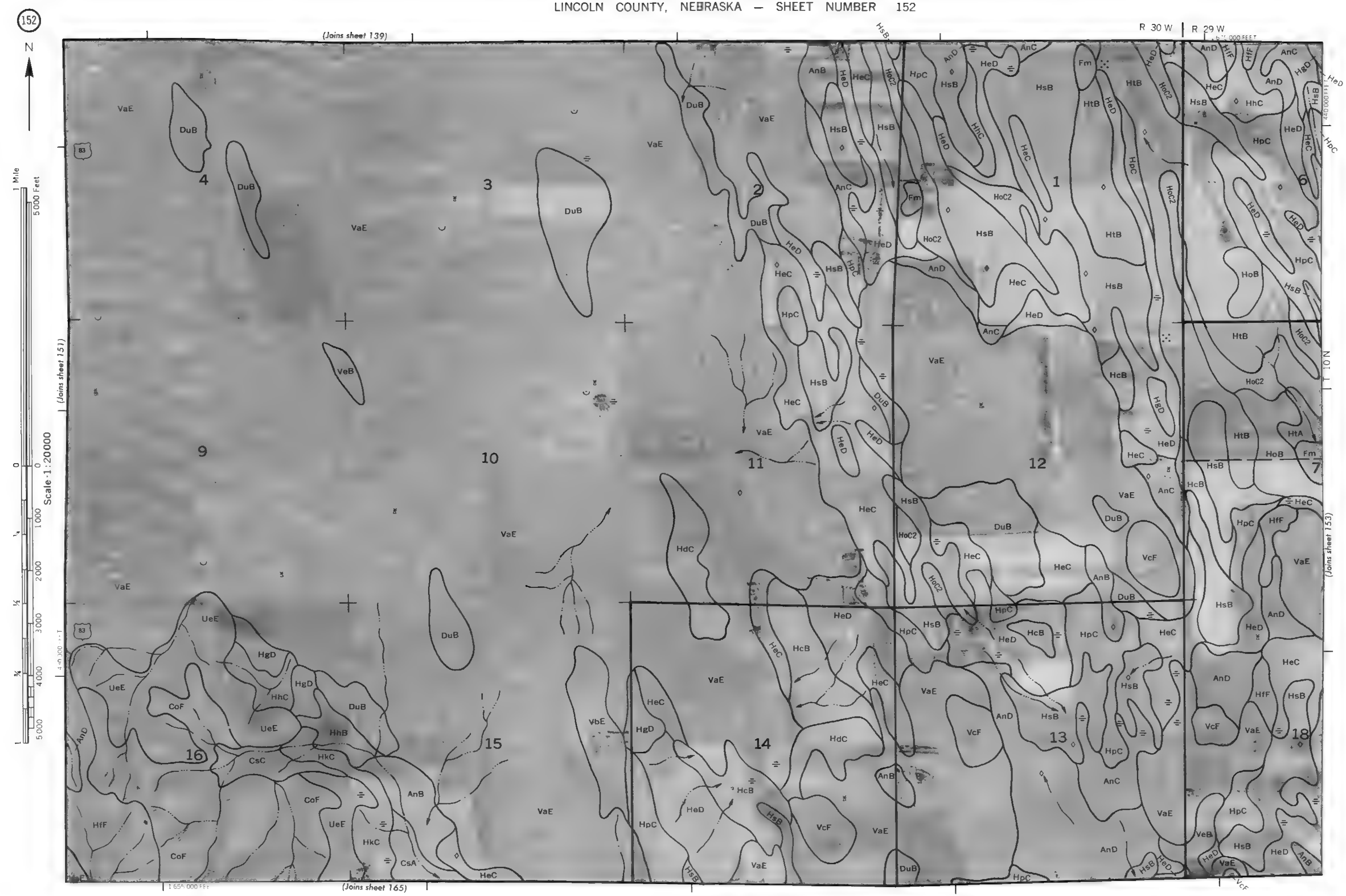
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 137)
R. 32 W.
R. 31 W.
1 625 000 FEET
440 000 FEET
(Joins sheet 149)
(Joins sheet 151)
(Joins sheet 163)
1 610 000 FEET
T. 10 N.
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1
2
3
4
5
6
7
8
9
10
12
13
15
16
17
18
AnD
HfF
VaE
VbB
HdC
DvC
VcF
CoF
CsB
DuB
EaB
Wx
Ma
Wb
HkC
Medicine
Creek
BURLINGTON
NORTHERN
23



LINCOLN COUNTY, NEBRASKA NO. 151

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


152
N
(Joins sheet 139)
(Joins sheet 151)
(Joins sheet 153)
(Joins sheet 165)
R 30 W
R 29 W
T 10 N
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
1
2
3
4
6
7
9
10
11
12
13
14
15
16
18
VaE
DuB
VeB
UeE
HgD
HhC
CoF
CsC
HkC
HhB
AnB
HfF
HkC
CsA
HeC
VbE
HdC
HeD
HcB
HpC
HsB
VcF
AnD
AnC
HeB
HoC2
HtB
HtA
HoB
Fm
HfF
HhC

LINCOLN COUNTY, NEBRASKA NO. 153

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 154

LINCOLN COUNTY, NEBRASKA NO. 155

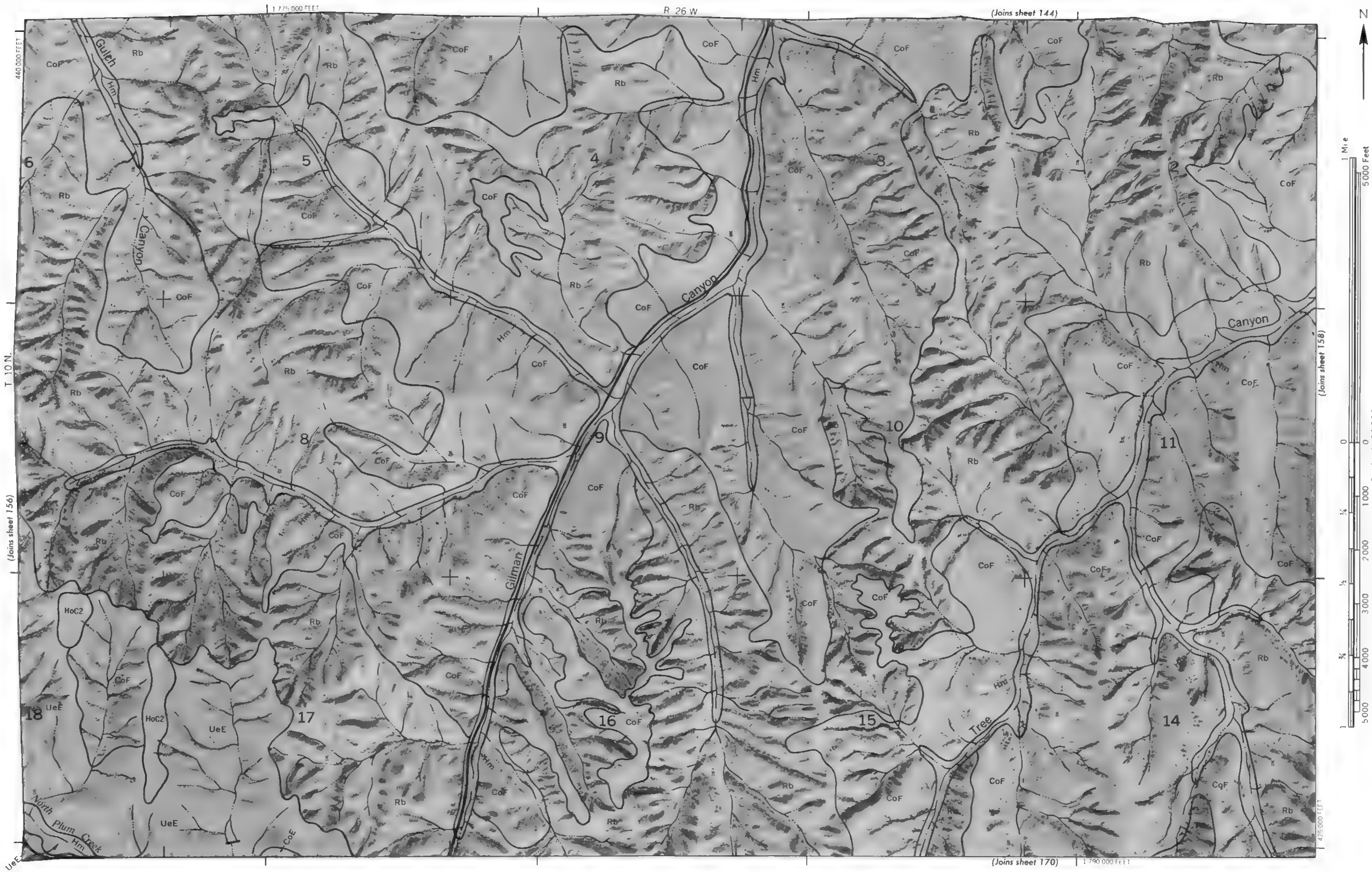
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners if shown are approximately positioned.

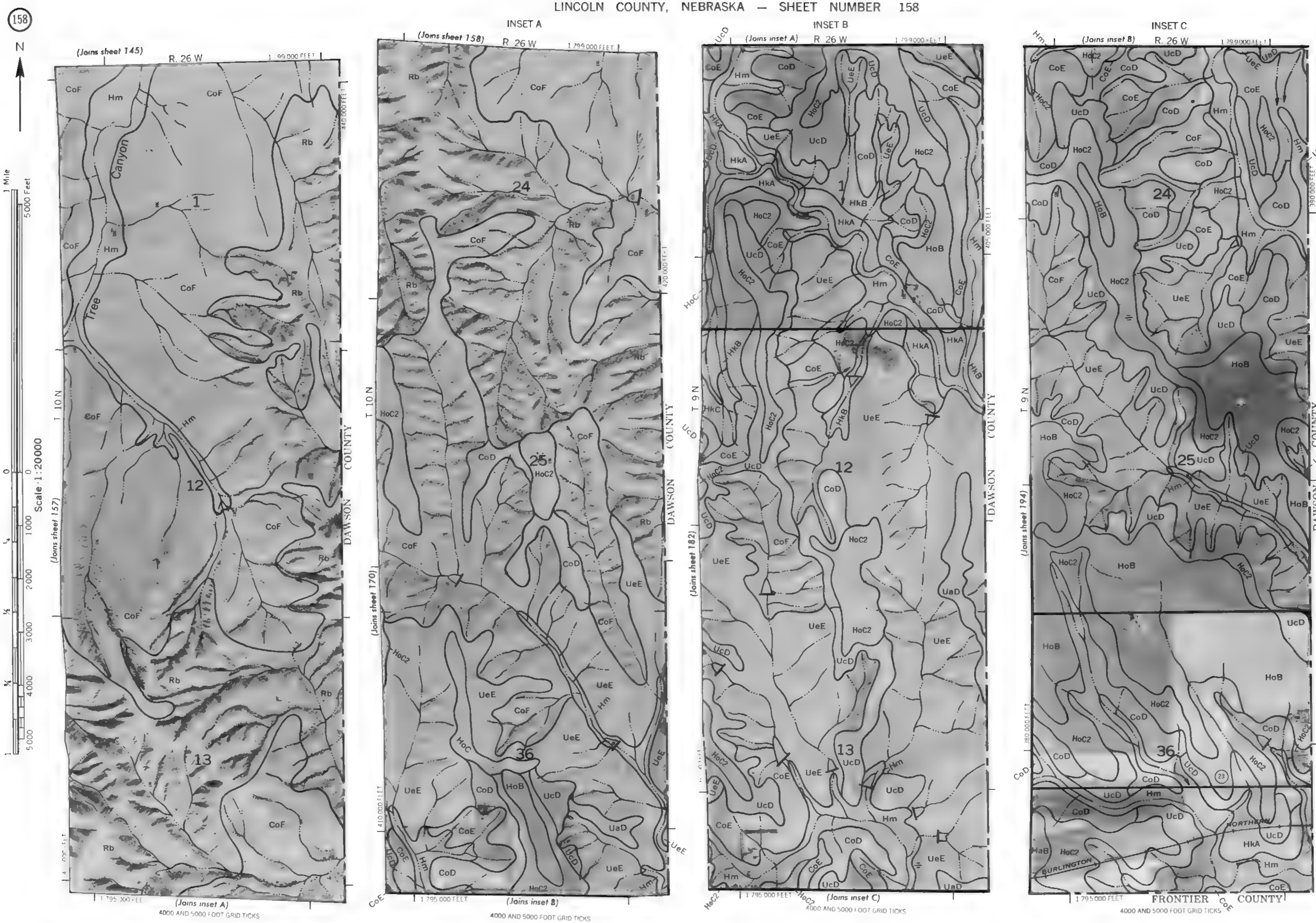
(156)

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 156

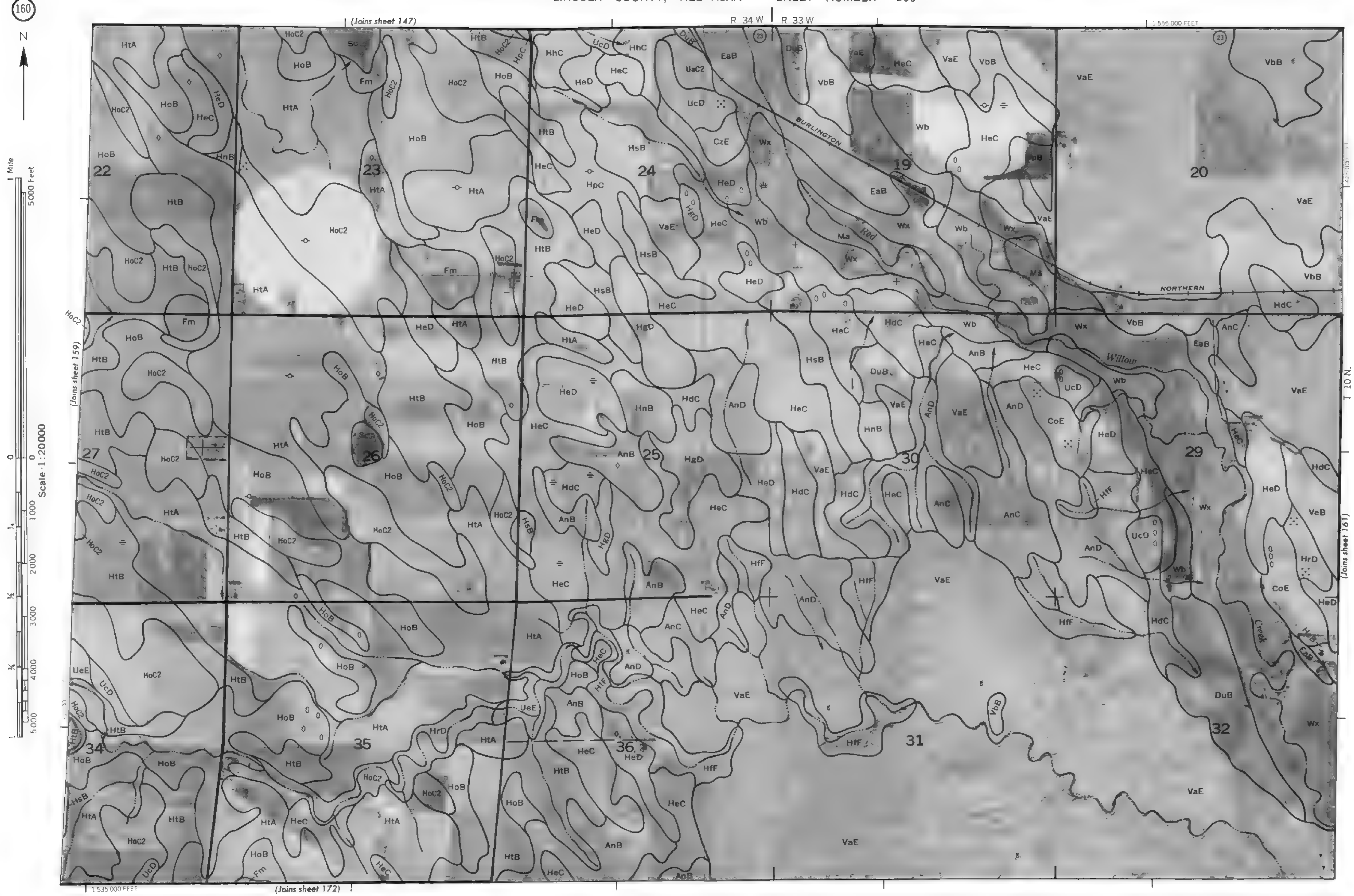
LINCOLN COUNTY, NEBRASKA NO. 157

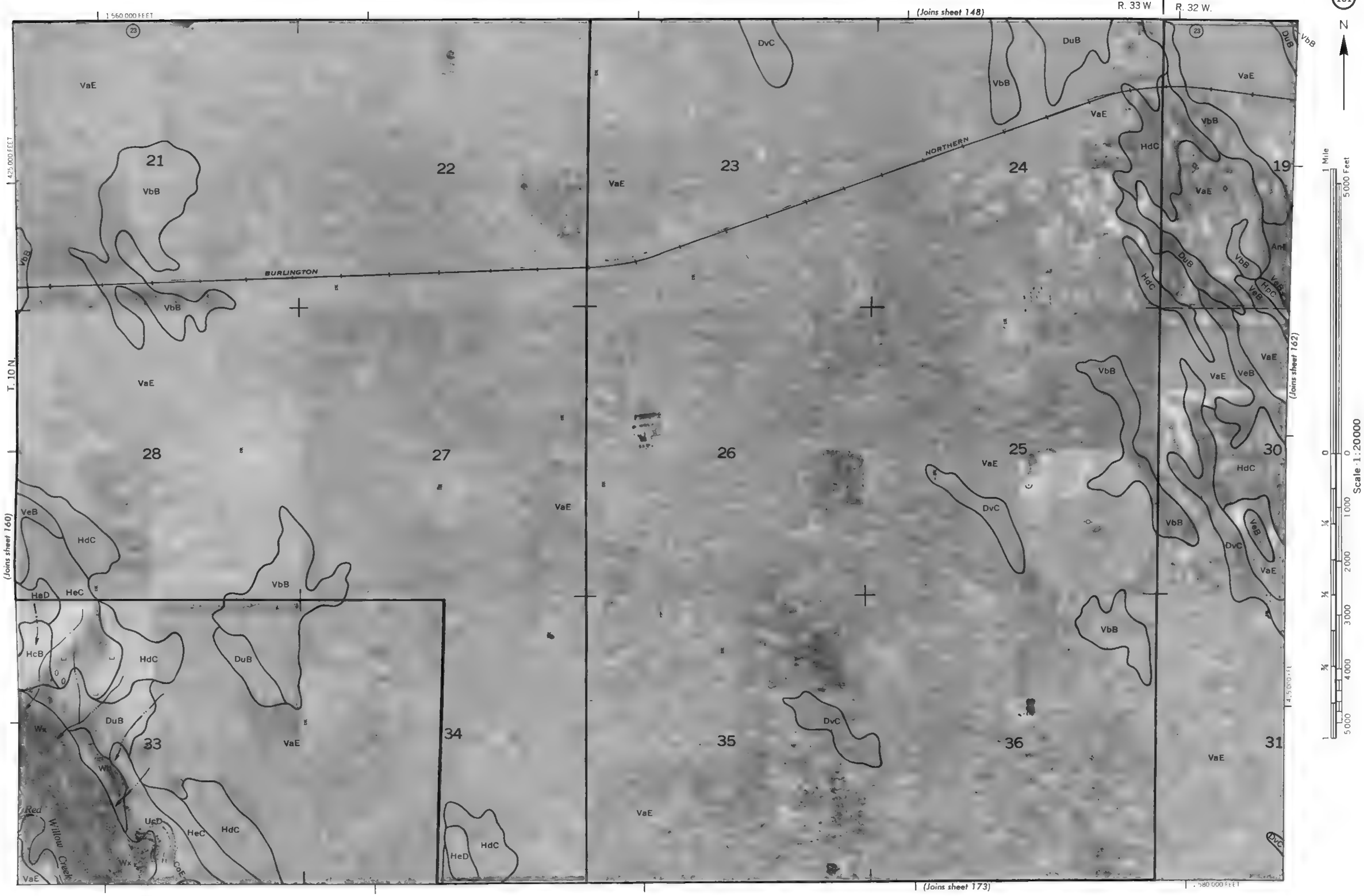



158
N
INSET A
INSET B
INSET C
(Joins sheet 145)
(Joins sheet 158)
(Joins inset A)
(Joins inset B)
(Joins inset C)
(Joins sheet 157)
(Joins sheet 170)
(Joins sheet 182)
(Joins sheet 194)
R. 26 W
T. 10 N
T. 9 N
DAWSON COUNTY
FRONTIER COUNTY
Canyon
Tree
BURLINGTON NORTHERN
Scale 1:20000
1 Mile
5000 Feet
4000 AND 5000 FOOT GRID TICKS

LINCOLN COUNTY, NEBRASKA NO. 159

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

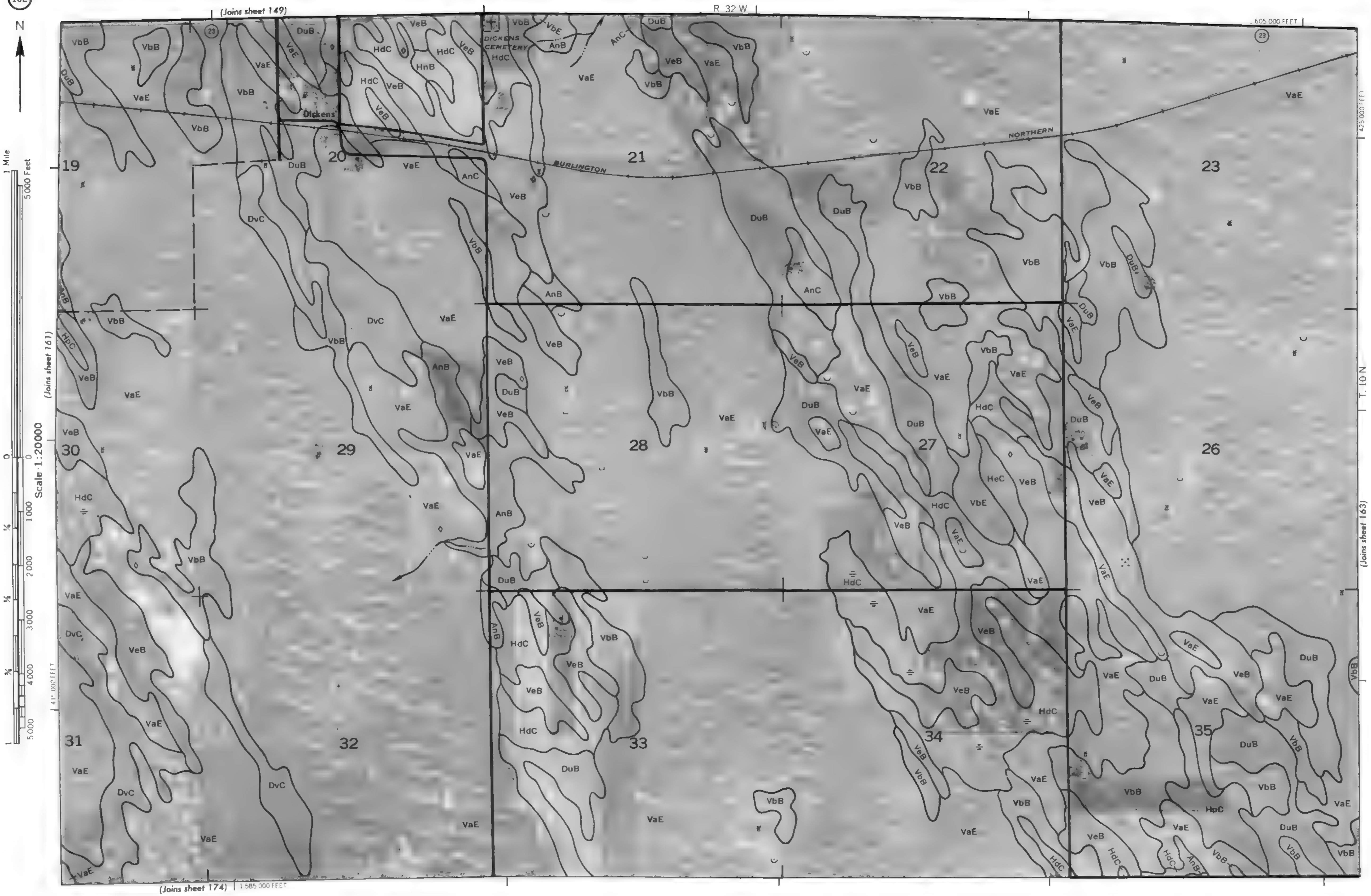

160
N
(Joins sheet 147)
(Joins sheet 159)
(Joins sheet 161)
(Joins sheet 172)
R 34 W
R 33 W
T 10 N.
1 555 000 FEET
1 535 000 FEET
1 Mile
5000 Feet
Scale 1:20000
BURLINGTON
NORTHERN
Red
Willow
Creek
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32

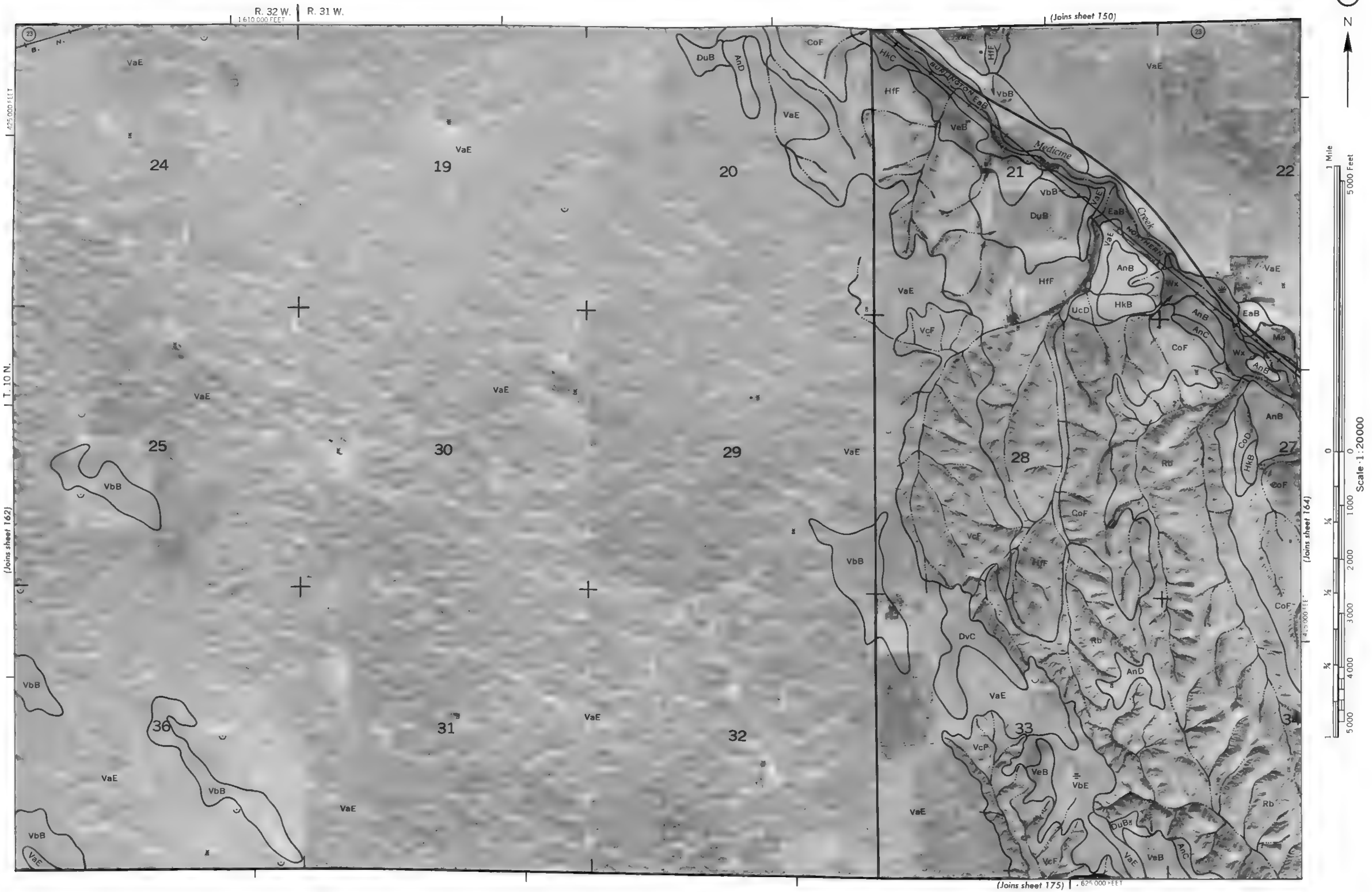


LINCOLN COUNTY, NEBRASKA NO. 161

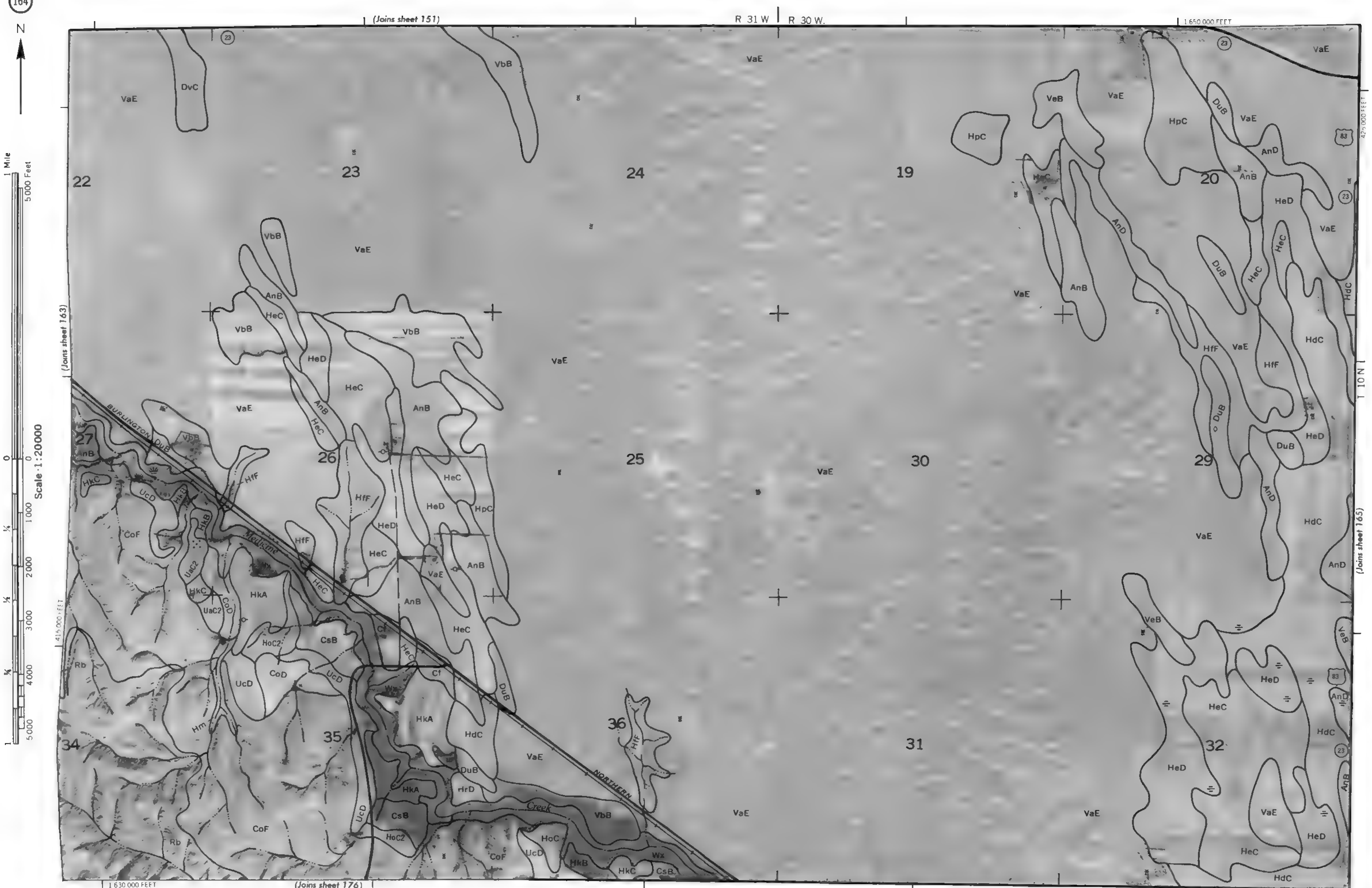
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 162





LINCOLN COUNTY, NEBRASKA NO. 163
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


164
N
(Joins sheet 151)
R 31 W
R 30 W.
1 650 000 FEET
425 000 FEET
(Joins sheet 163)
(Joins sheet 165)
T 10 N
(Joins sheet 176)
1 630 000 FEET
415 000 FEET
1 Mile
5000 Feet
Scale 1:20000
BURLINGTON
NORTHERN
Medicine
Creek
22
23
24
19
20
27
26
25
30
29
34
35
36
31
32
VaE
VbB
DvC
HpC
VeB
AnB
AnD
HeC
HeD
HdC
DuB
HfF
CoF
UcD
HkA
HkC
CsB
CoD
Rb
Hm
HrD
Wx

LINCOLN COUNTY, NEBRASKA NO. 165

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 153)
R 29 W
1 700 000 FEET
425 000 FEET
T. 10 N.
(Joins sheet 165)
(Joins sheet 167)
(Joins sheet 178)
1 680 000 FEET
410 000 FEET
Scale 1:20000
1 Mile
5000 Feet
Well
Canyon
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35

LINCOLN COUNTY, NEBRASKA NO. 167

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 168

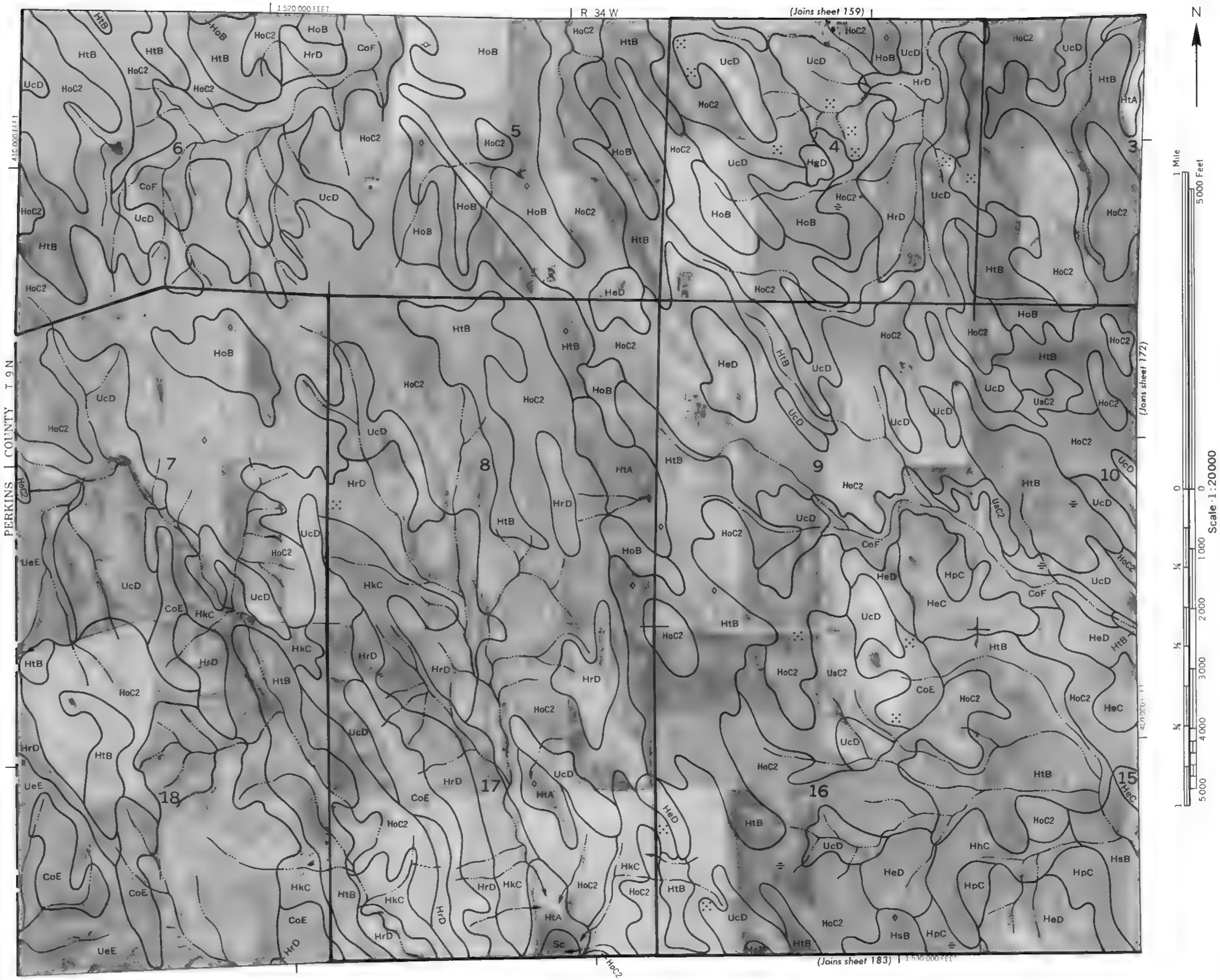
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 168

LINCOLN COUNTY, NEBRASKA NO. 169

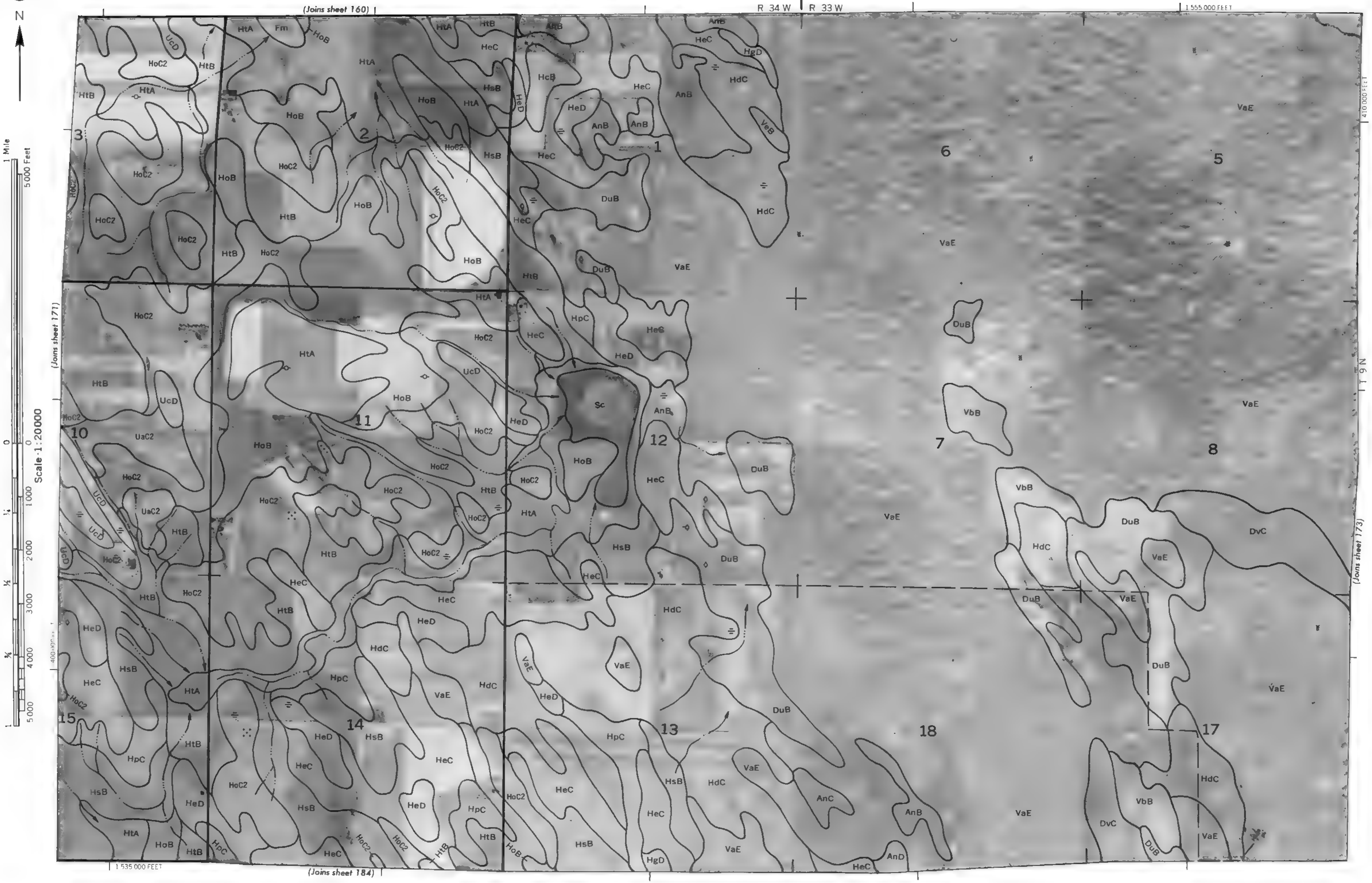
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 157)
R. 26 W.
1 790 000 FEET
(Joins sheet 169)
(Joins inset A, sheet 158)
(Joins sheet 182)
1 775 000 FEET
420 000 FEET
T. 10 N.
Scale 1:20000
1 Mile
5 000 Feet
North
Plum
Creek
19
20
21
22
23
26
27
28
29
30
31
32
33
34
35
UeE
CoE
CoF
CoD
HoC2
HoC
HoB
Hm
Rb
UcD
UaD
HkC
HkB
CoE



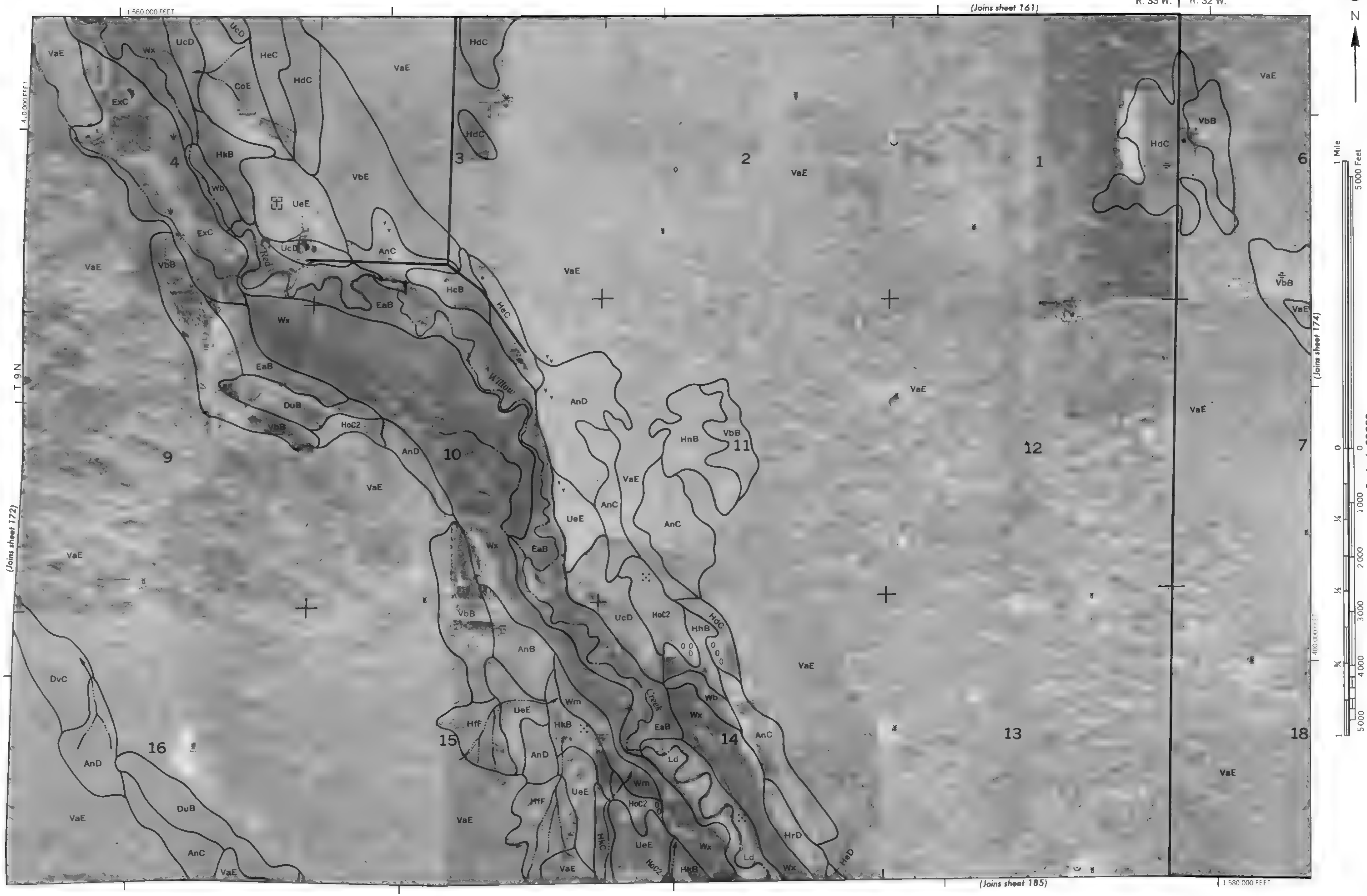
LINCOLN COUNTY, NEBRASKA NO. 171

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



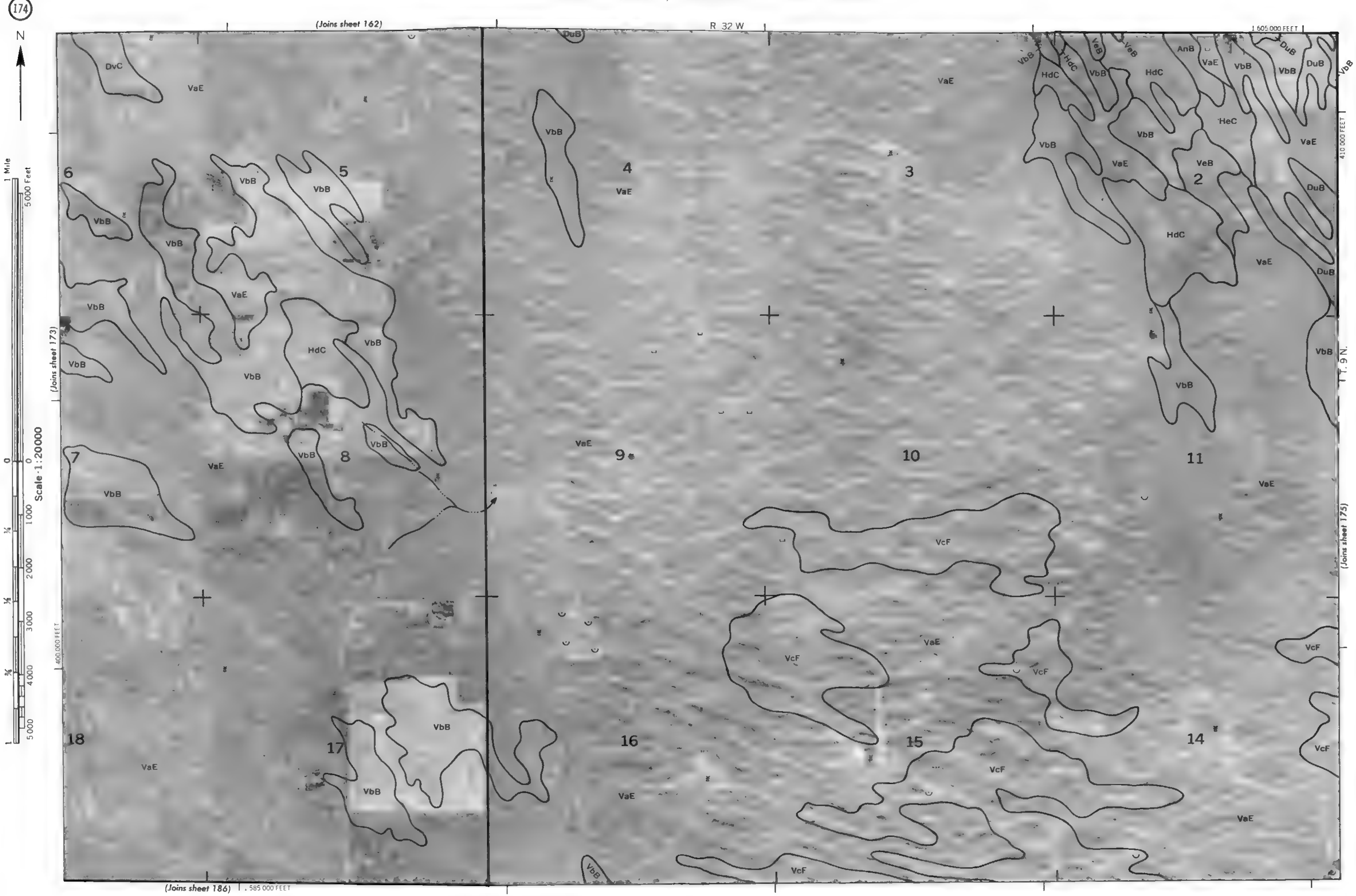
This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 172



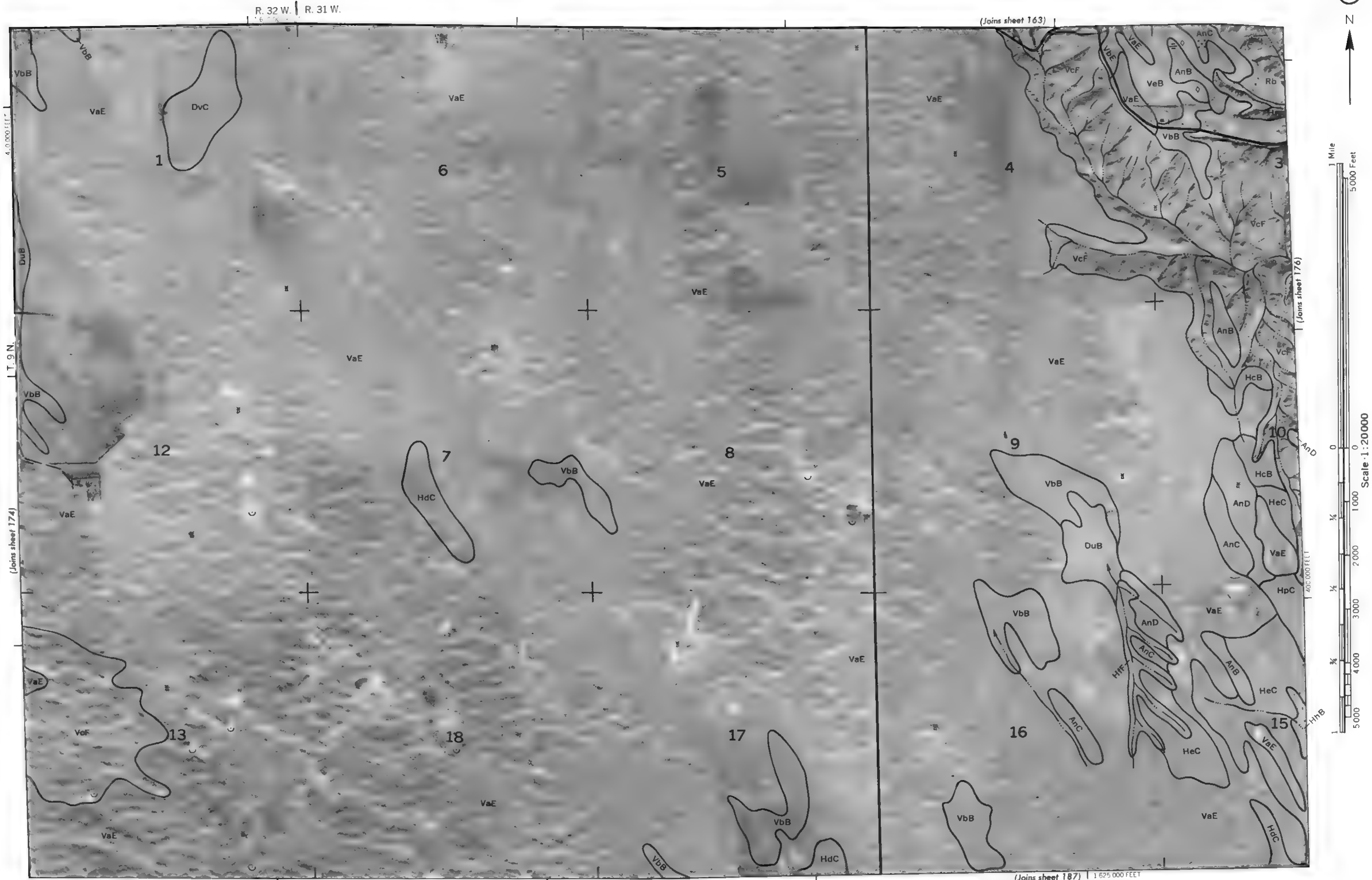
LINCOLN COUNTY, NEBRASKA NO. 173

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(175)

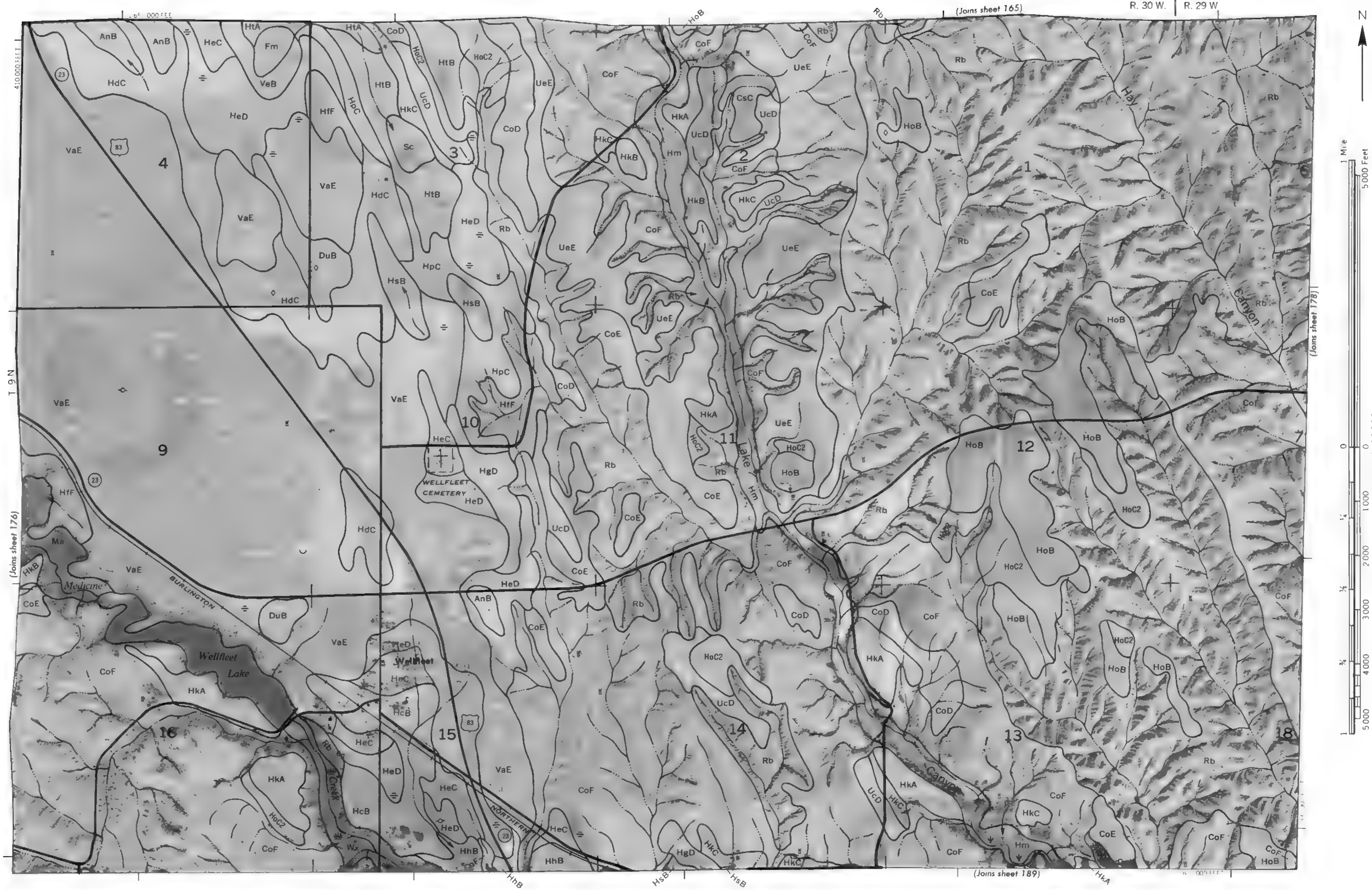


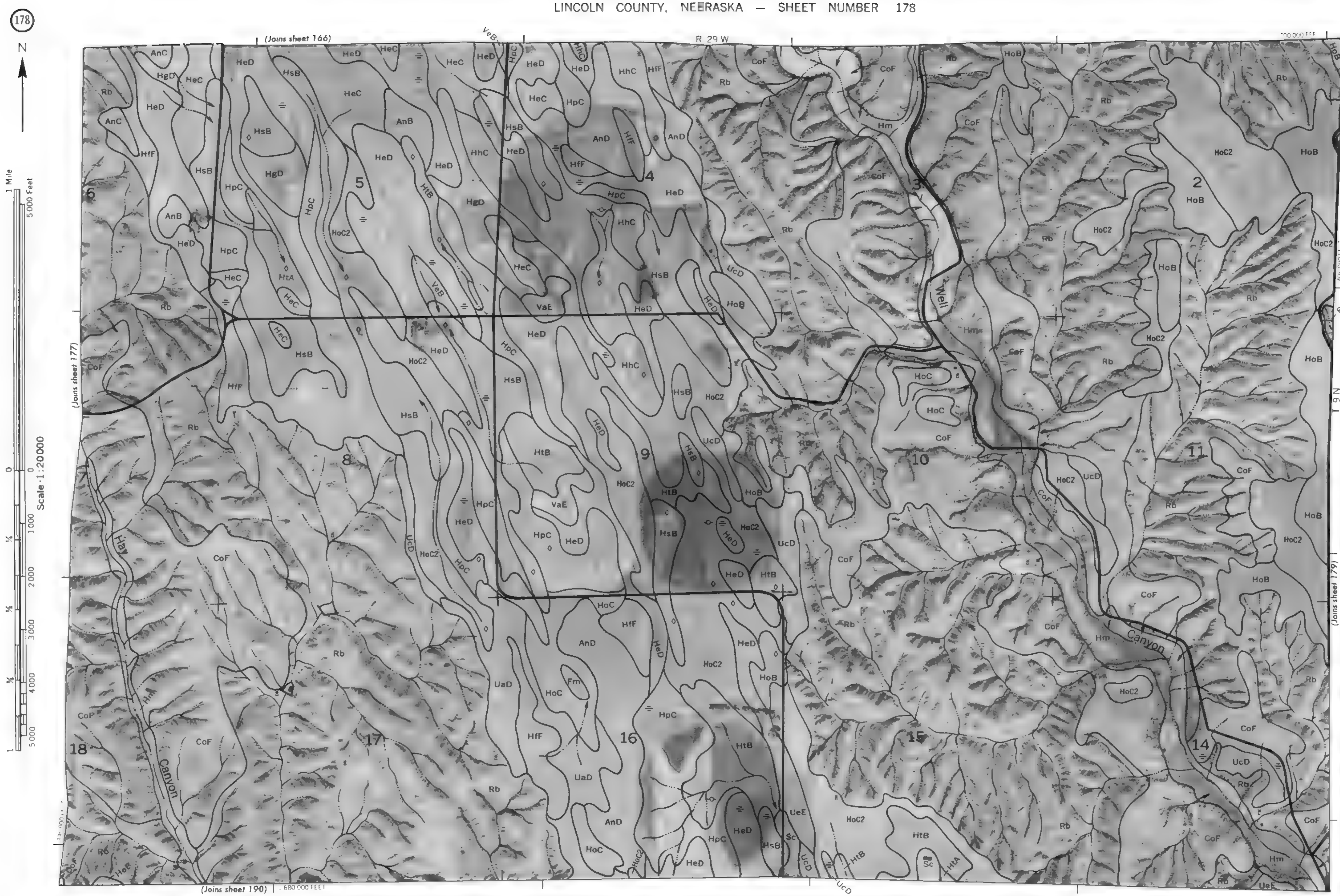
LINCOLN COUNTY, NEBRASKA NO. 175

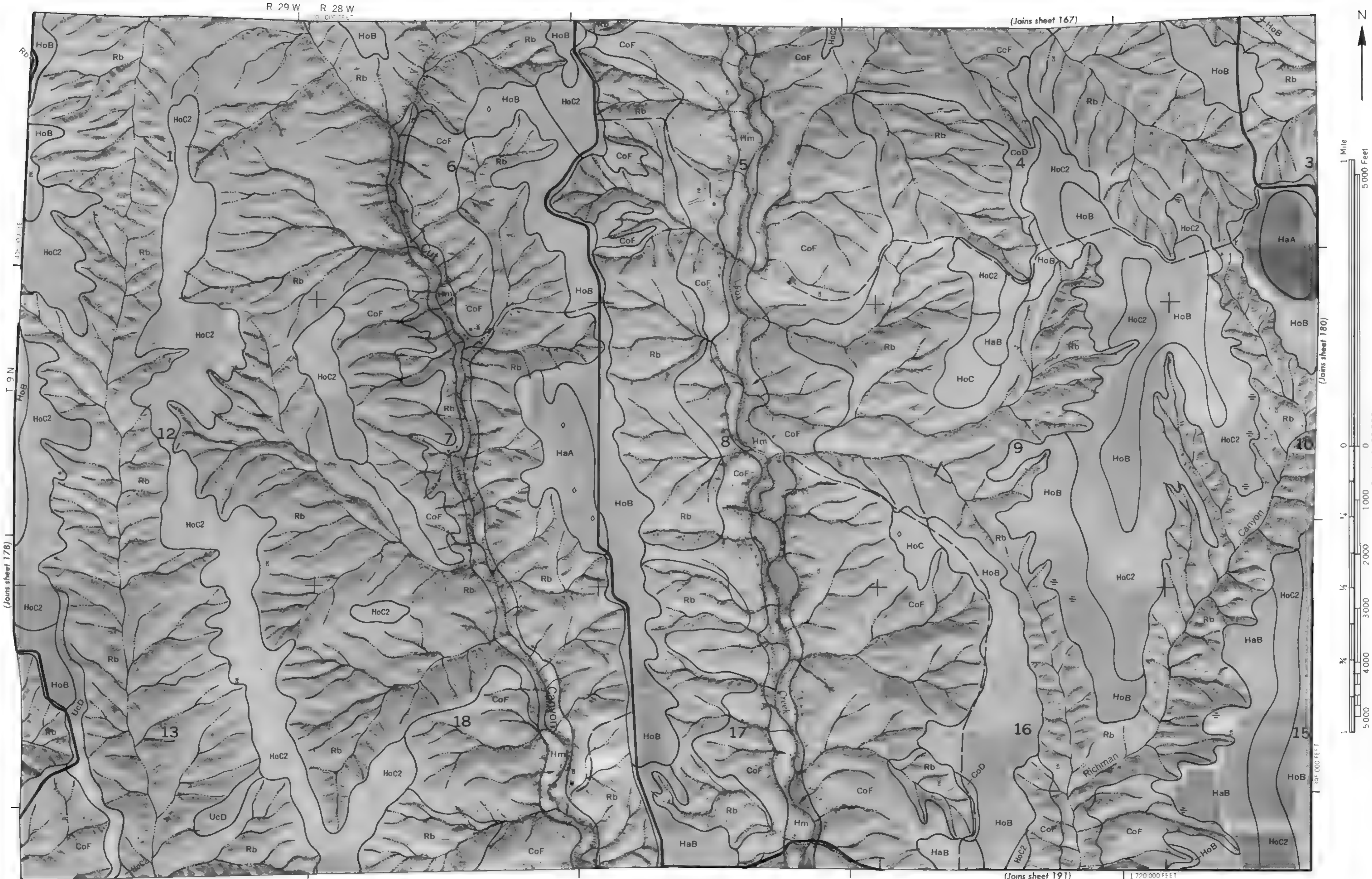
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 164)
R 31 W
R 30 W
1 650 000 FEET
410 000 FEET
(Joins sheet 175)
(Joins sheet 177)
(Joins sheet 188)
1 630 000 FEET
400 000 FEET
T. 9 N
BURLINGTON
NORTHERN
Medicine
Creek
1 Mile
5000 Feet
Scale 1:20000
1
2
3
5
6
7
8
10
11
12
13
14
15
17
18
VaE
HdC
DuB
CoF
Rb
UcD
HkB
HkC
CsB
Wm
Ma
CoD
HkA
HfF
CoE
HoC2
UeE
UaD
HoC
HaB
HeC
HeD
HpC
AnD
HsB
HhB
HhC
HcB
HoB
HaA
HtB
VbB
AnB
Fm
VcF
AnC
Hm
Wx

LINCOLN COUNTY, NEBRASKA NO. 177

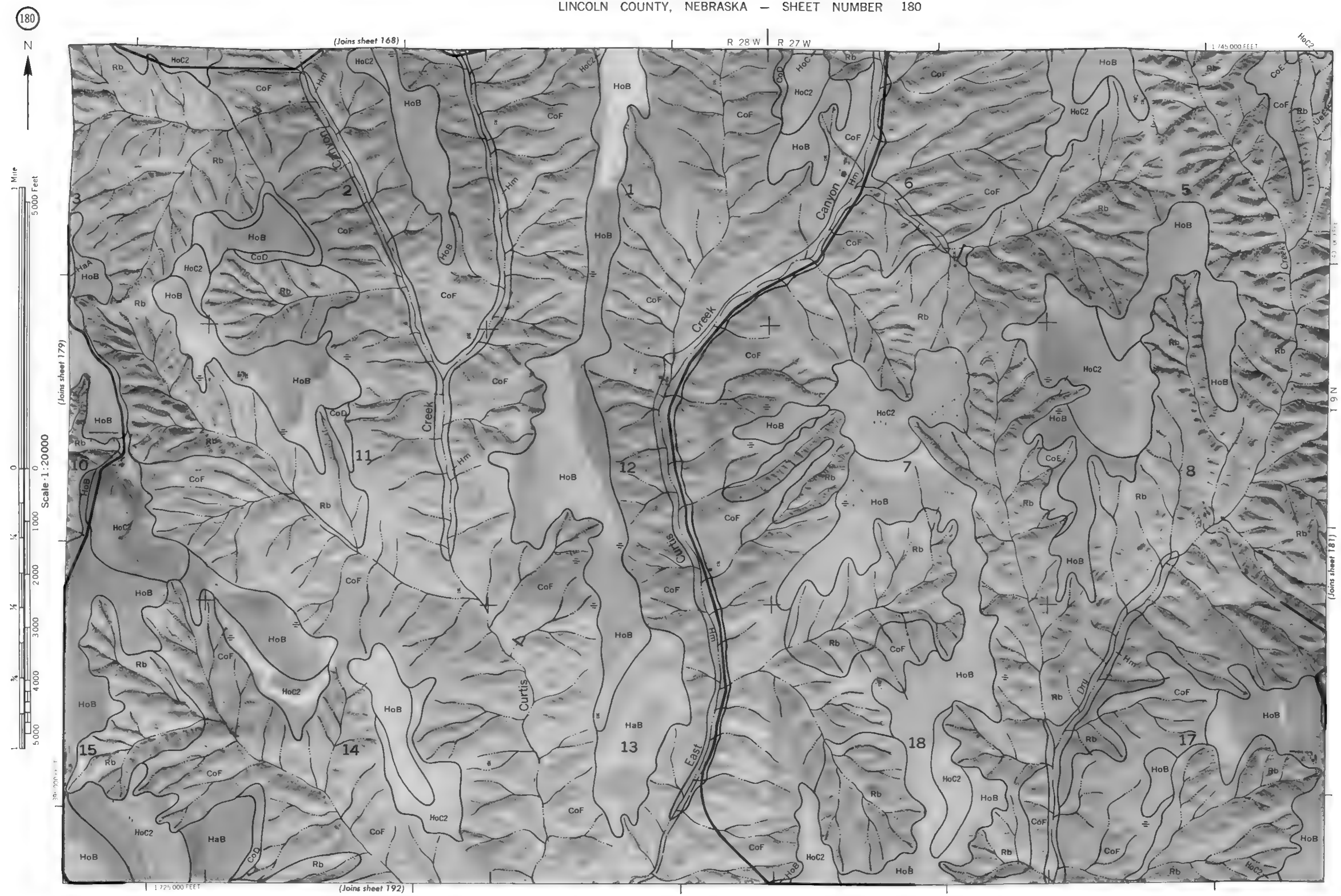



178
N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 166)
R 29 W
(Joins sheet 177)
(Joins sheet 179)
(Joins sheet 190)
680 000 FEET
T 9 N
Hay
Canyon
Well
Canyon
2
3
4
5
6
7
8
9
10
11
14
15
16
17
18



LINCOLN COUNTY, NEBRASKA NO. 179

This map is compiled on 1964 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

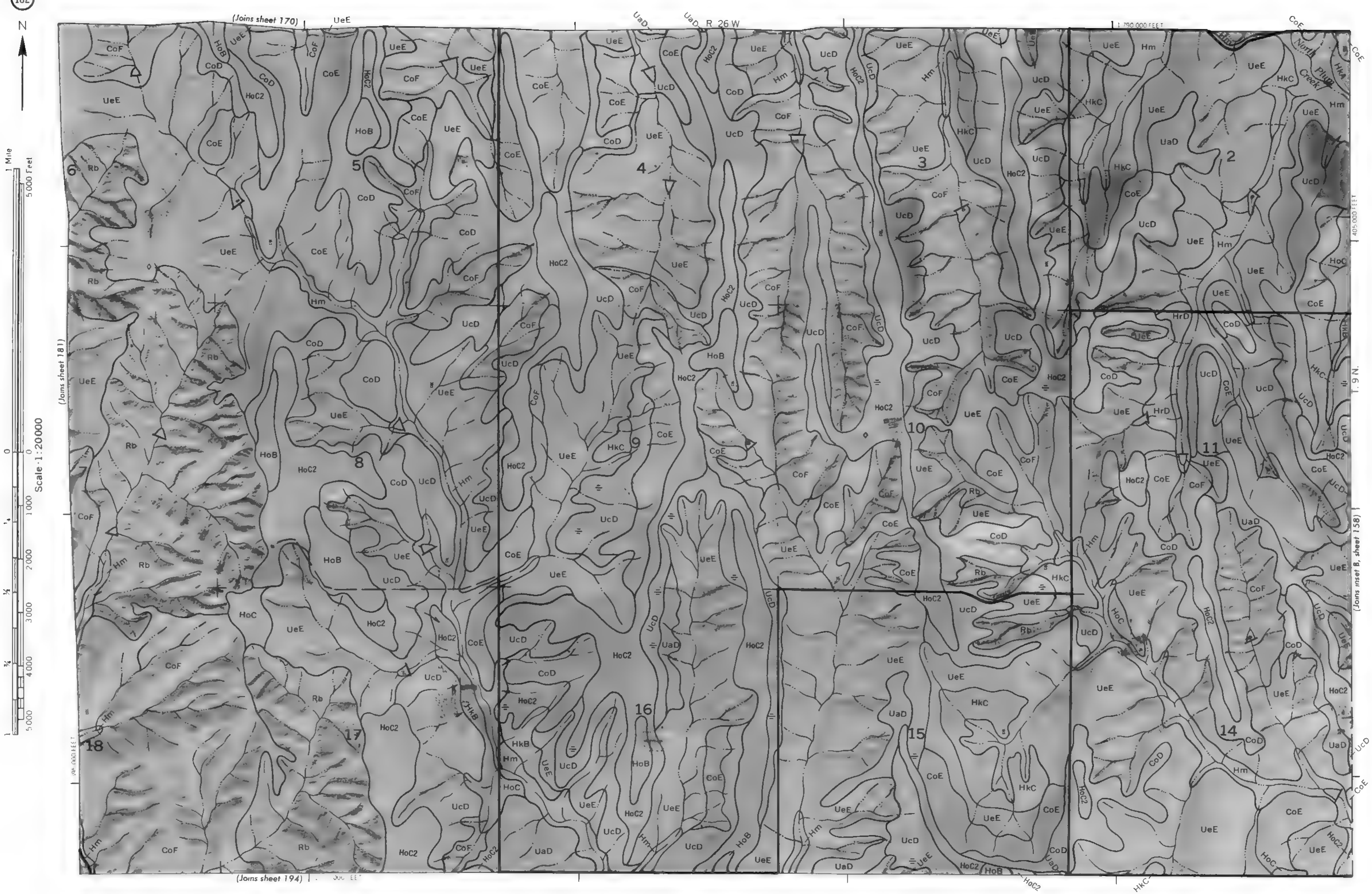


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 180

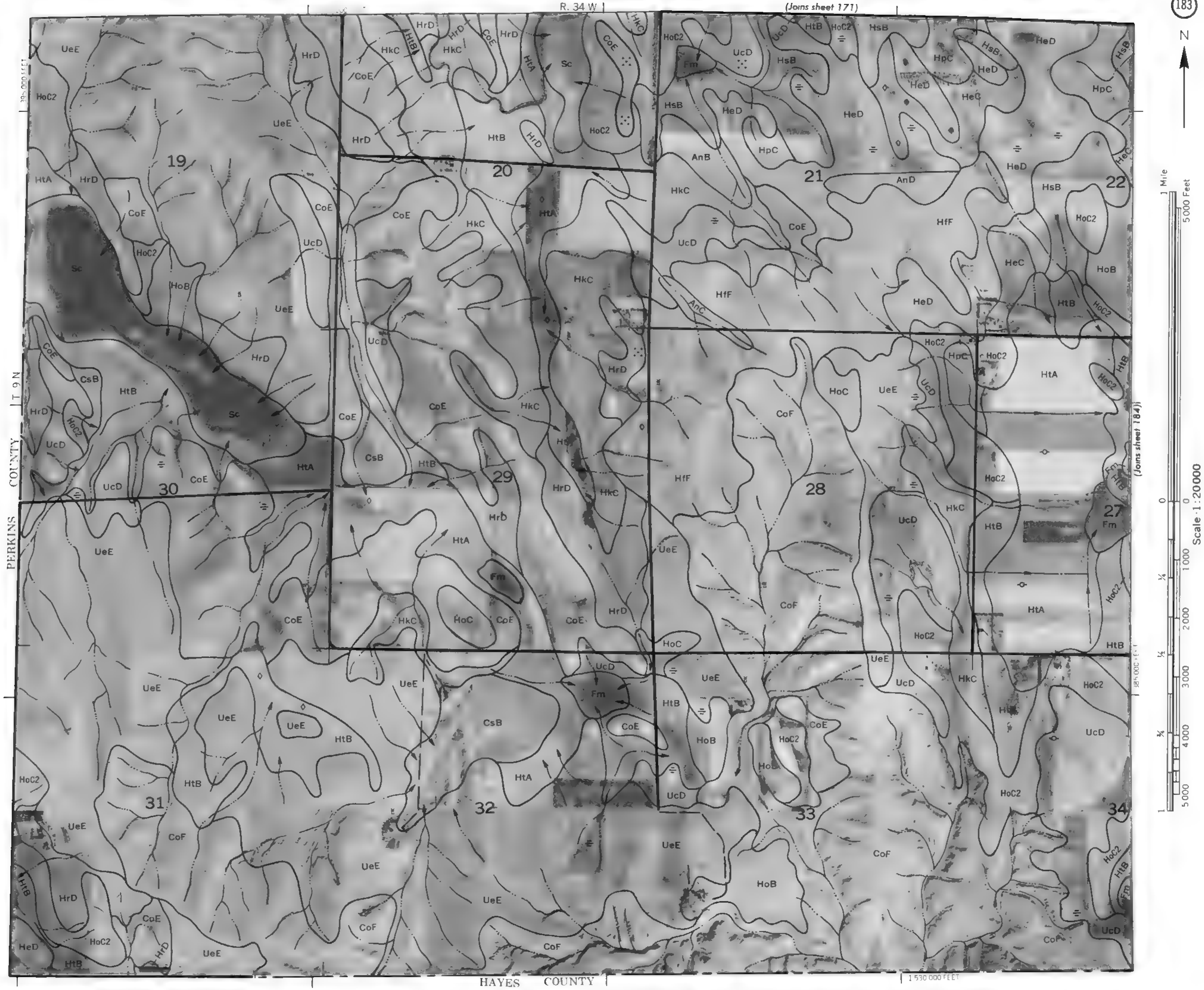
LINCOLN COUNTY, NEBRASKA NO. 181

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


182
N
(Joins sheet 170)
R. 26 W.
(Joins sheet 181)
(Joins inset B, sheet 158)
T. 9 N.
(Joins sheet 194)
Scale 1:20000
North Plum Creek

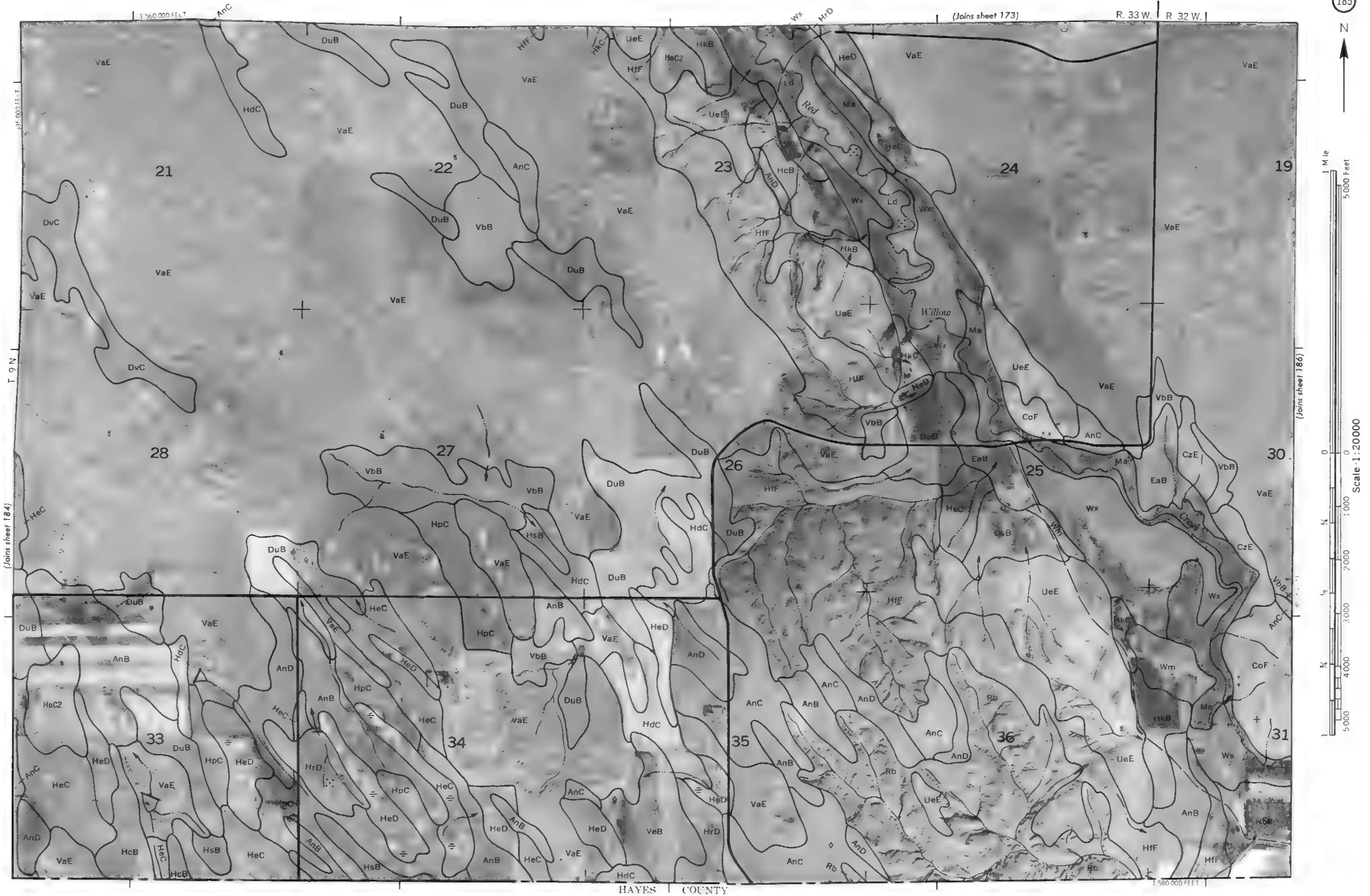
LINCOLN COUNTY, NEBRASKA NO. 183

This map is compiled on 1971 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

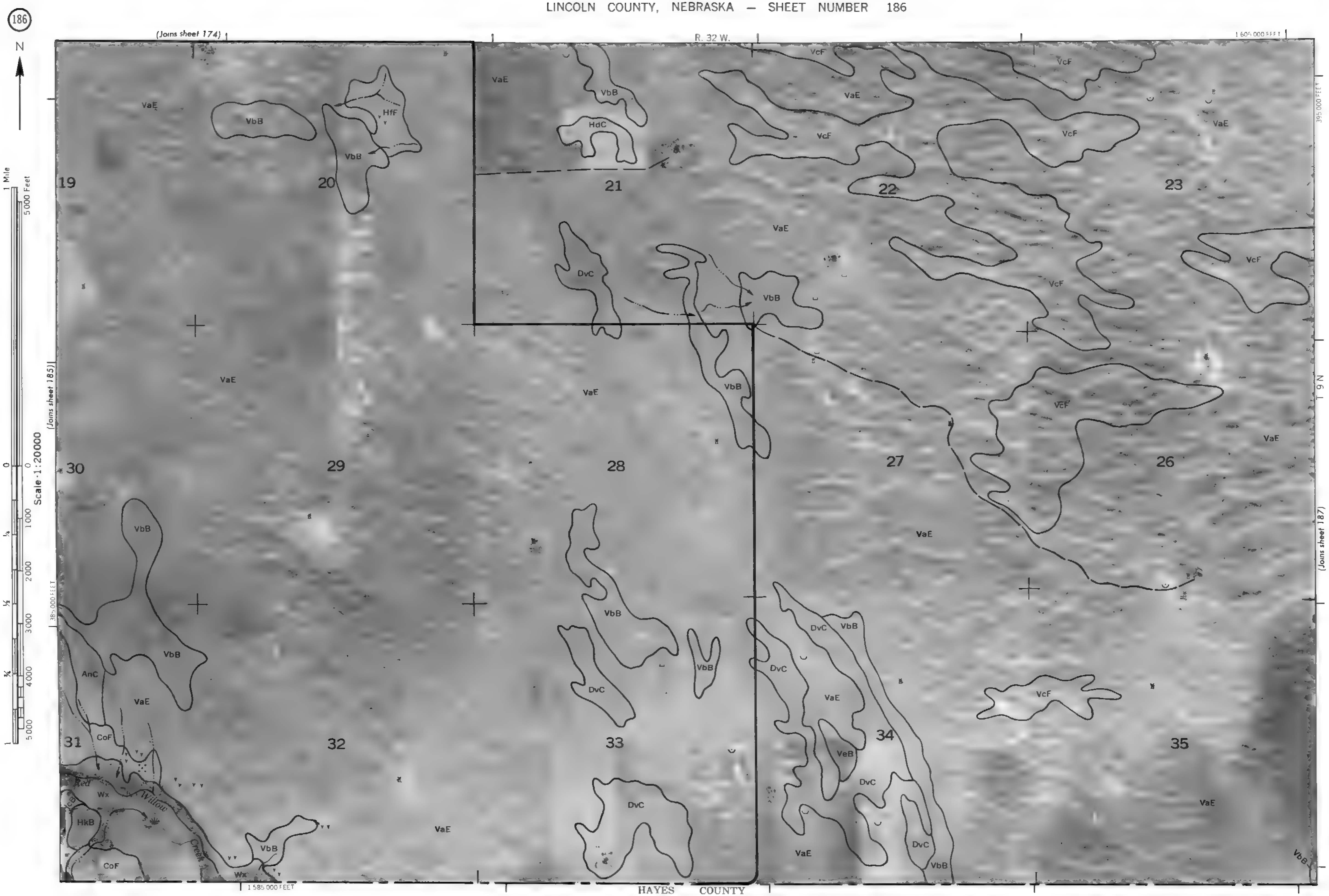


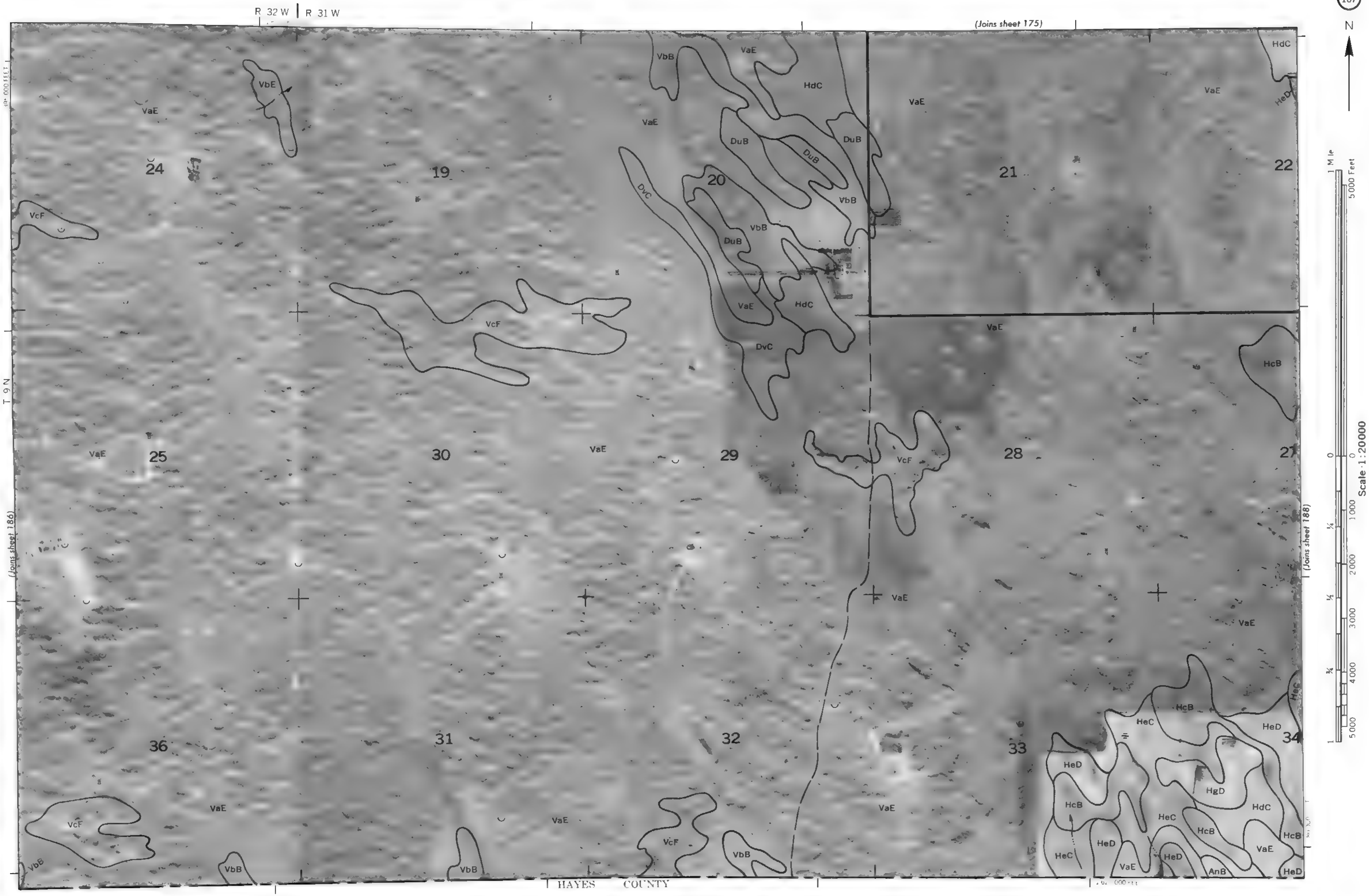
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 184



LINCOLN COUNTY, NEBRASKA NO. 185


186
N
(Joins sheet 174)
R. 32 W.
1 605 000 FEET
395 000 FEET
(Joins sheet 185)
(Joins sheet 187)
385 000 FEET
1 585 000 FEET
T. 9 N.
HAYES COUNTY
1 Mile
5000 Feet
Scale 1:20000
19
20
21
22
23
30
29
28
27
26
31
32
33
34
35
VaE
VbB
HfF
HdC
VcF
DvC
AnC
CoF
Wx
HkB
VeB
Red Willow Creek

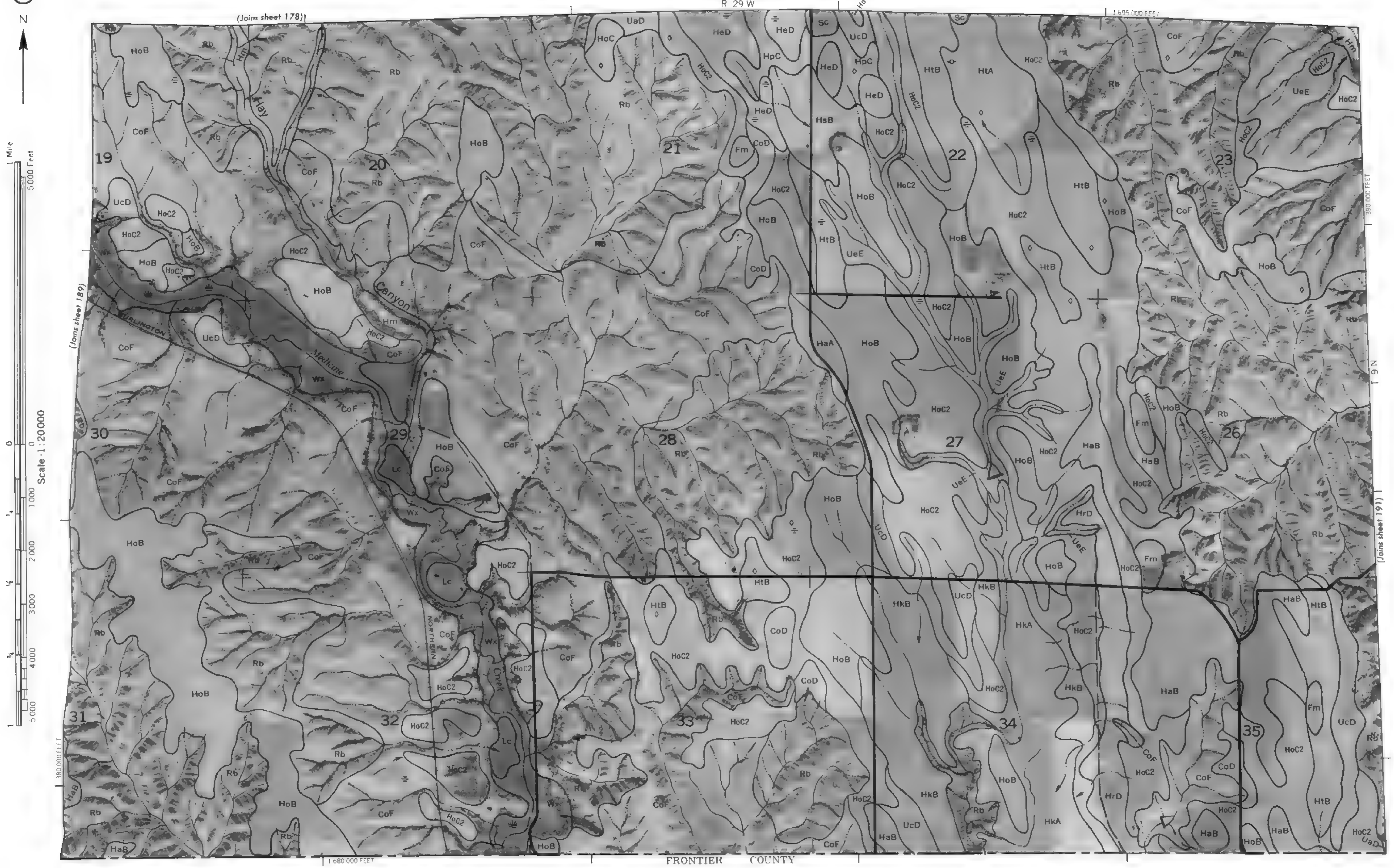


LINCOLN COUNTY, NEBRASKA NO 187

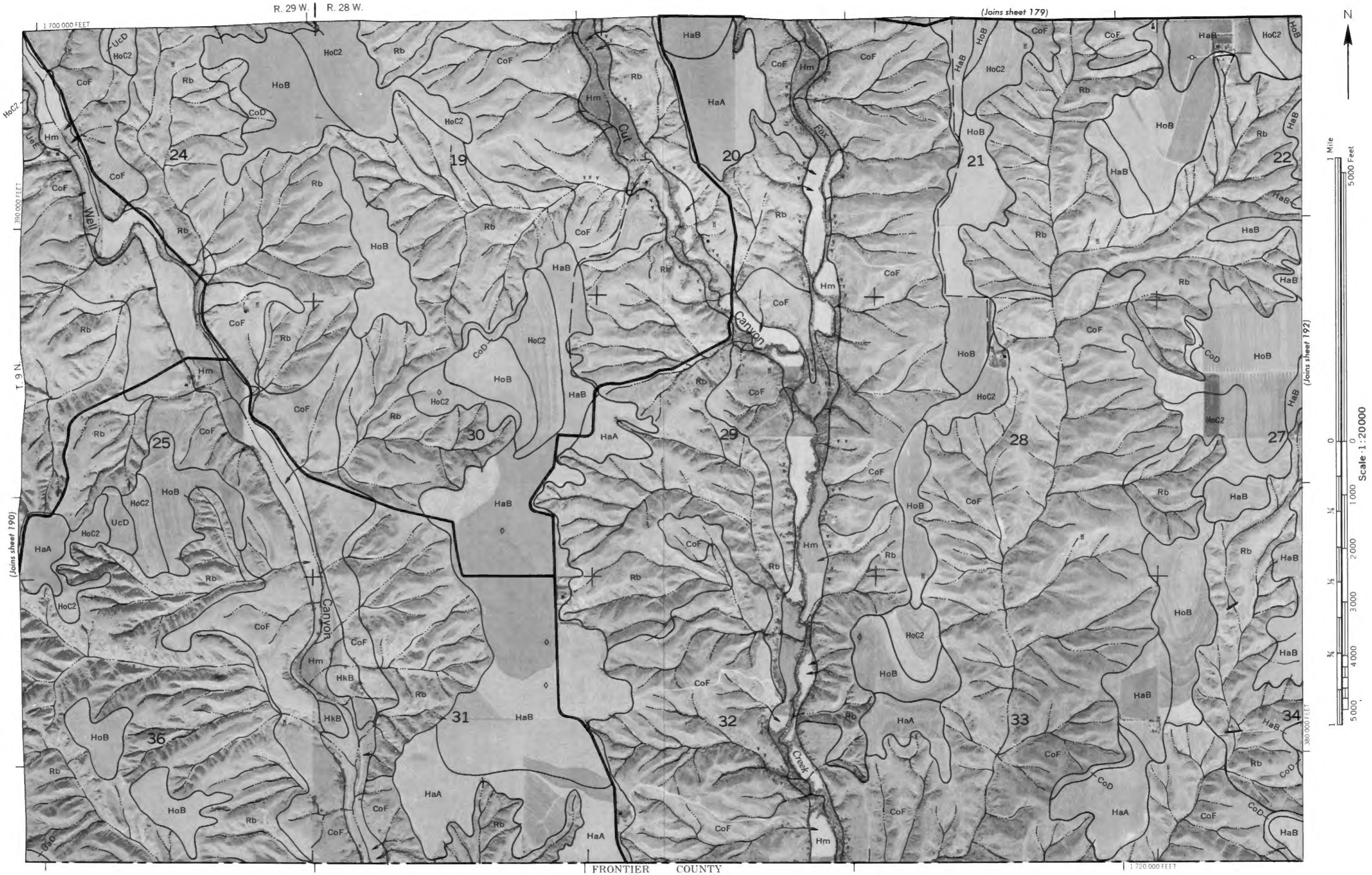
LINCOLN COUNTY, NEBRASKA NO. 188

LINCOLN COUNTY, NEBRASKA NO. 189

LINCOLN COUNTY, NEBRASKA — SHEET NUMBER 190



LINCOLN COUNTY, NEBRASKA NO. 190



LINCOLN COUNTY, NEBRASKA NO. 191

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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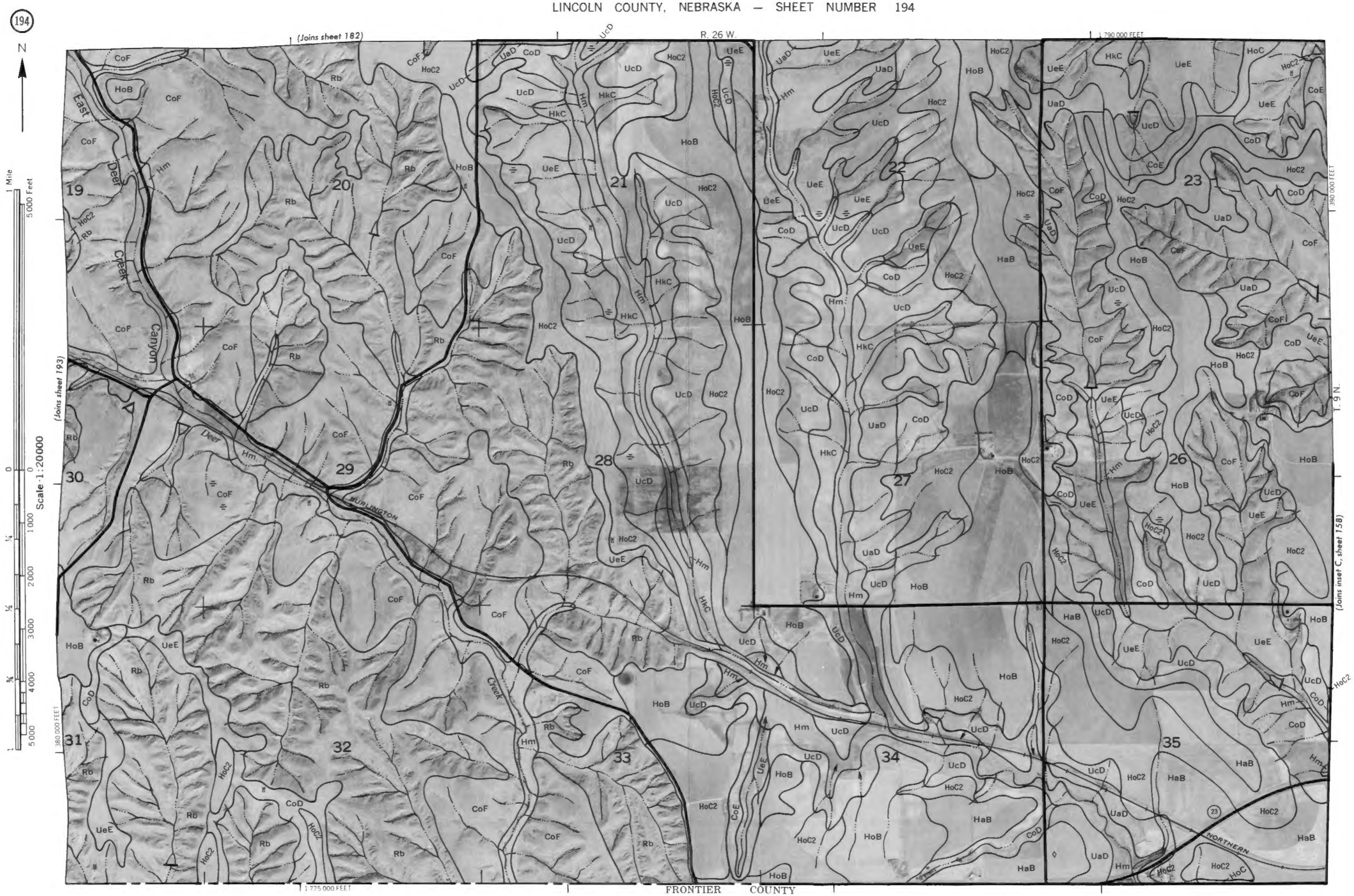
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 192


193
N
1 750 000 FEET
(Joins sheet 181)
R. 27 W.
R. 26 W.
390 000 FEET
T. 9 N.
(Joins sheet 192)
(Joins sheet 194)
380 000 FEET
1 770 000 FEET
FRONTIER
COUNTY
West
Deer
Creek
Canyon
NORTHERN
BURLINGTON
21
22
23
24
19
28
27
26
25
30
33
34
35
36
31
HoB
HoC2
CoF
Rb
HaB
HoC
Hm
HaA
CoD
Fm
1 Mile
5000 Feet
Scale 1:20000
0
¼
½
¾
1000
2000
3000
4000
5000



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY, NEBRASKA NO. 194